Cisco 2500 Series

This chapter provides information on the Cisco 2500 series routers. The information is organized into the following sections:

- Product Overview

- Standard Features

- Software Options

- Hardware Options

- Single LAN Routers

- Mission-Specific Routers

- Router/Hub Combinations

- Access Servers

- Dual LAN Routers

- Modular Routers

Note   Documentation for the Cisco 2500 series is available in two forms: on a CD-ROM called Cisco Connection Documentation, Enterprise Series (formerly called UniverCD) and printed books. You can request a free copy of the documentation CD when you place an order and have the option of subscribing to a CD update service. Installation documentation ships with each chassis, and a configuration note ships with each component ordered. All configuration notes are available on the CD.

You can also access Cisco technical documentation on the World Wide Web URL http://www.cisco.com. For more information, see the chapter "Documentation" at the end of the catalog.

Product Overview

The Cisco 2500 series routers provide a variety of models designed for small office and remote site environments. Each model supports at least two of the following interfaces:

- Ethernet
- Token Ring
- Synchronous serial
- Asynchronous serial
- ISDN BRI
- Hub

Cisco 2500 routers come with Flash EPROM technology for simplified software maintenance. These systems support a variety of Cisco IOS software feature sets, so you can choose a feature set that supports your specific protocol environment. The software feature sets range from an IP and bridging-only to the full array of Cisco's software functionality, including APPN and RMON.

Mission-specific models contain less memory and less hardware functionality in order to support a subset of protocols. Each mission-specific model can be upgraded to full router capability by downloading a new Cisco IOS software feature set and, if necessary, adding memory.

Cisco 2500 series models can be divided into the following categories:

- Single LAN routers—Models 2501, 2502, 2503, 2504, 2520, 2521, 2522, and 2523
- Mission-specific, entry-level routers—Models 2501CF, 2502CF, 2503I, 2504I, 2520CF, 2520LF, 2521CF, 2521LF, 2522CF, 2522LF, 2523CF, and 2523LF
- Router/hub combinations—Models 2505, 2507, 2516, 2517, 2518, and 2519
- Access servers—Models 2509 to 2512 (refer to the section "Cisco 2500 Series Access Servers" in the chapter "Access Servers" later in the catalog)
- Dual LAN routers—Models 2513, 2514, and 2515
- Modular routers—Models 2524 and 2525

Table 134   Cisco 2500 Series Router Product Numbers

Model	Description	Product Number
Cisco 2501	1 Ethernet, 2 serial, AC power supply	CISCO2501
Cisco 2501-DC	1 Ethernet, 2 serial, DC power supply	CISCO2501-DC
Cisco 2501CF[1]	2 serial, CFRAD software, AC power supply	CISCO2501CF
Cisco 2501LF	1 Ethernet, 2 serial, LAN FRAD software, AC power supply	CISCO2501LF
Cisco 2502	1 Token Ring, 2 serial, AC power supply	CISCO2502
Cisco 2502CF[1]	2 serial, CFRAD software, AC power supply	CISCO2502CF
Cisco 2502LF	1 Token Ring, 2 serial, LAN FRAD software, AC power supply	CISCO2502LF
Cisco 2503	1 Ethernet, 2 serial, 1 ISDN BRI, AC power supply	CISCO2503

Model	Description	Product Number
Cisco 2503-DC	1 Ethernet, 2 serial, 1 ISDN BRI, DC power supply	CISCO2503-DC
Cisco 2503I[1]	1 Ethernet, 1 ISDN BRI, ISDN software, AC power supply	CISCO2503I
Cisco 2503I-DC[1]	1 Ethernet, 1 ISDN BRI, ISDN software, DC power supply	CISCO2503I-DC
Cisco 2504	1 Token Ring, 2 serial, 1 ISDN BRI, AC power supply	CISCO2504
Cisco 2504-DC	1 Token Ring, 2 serial, 1 ISDN BRI, DC power supply	CISCO2504-DC
Cisco 2504I[1]	1 Token Ring, 1 ISDN BRI, ISDN software, AC power supply	CISCO2504I
Cisco 2505	8 Ethernet UTP hub ports, 2 serial, AC power supply	CISCO2505
Cisco 2505-DC	8 Ethernet UTP hub ports, 2 serial, DC power supply	CISCO2505-DC
Cisco 2507	16 Ethernet UTP hub ports, 2 serial, AC power supply	CISCO2507
Cisco 2507-DC	16 Ethernet UTP hub ports, 2 serial, DC power supply	CISCO2507-DC
Cisco 2509[2]	1 Ethernet, 2 serial, 8 async serial, AC power supply	CISCO2509
Cisco 2509-DC[2]	1 Ethernet, 2 serial, 8 async serial, DC power supply	CISCO2509-DC
Cisco 2510[2]	1 Token Ring, 2 serial, 8 async serial, AC power supply	CISCO2510
Cisco 2511[2]	1 Ethernet, 2 serial, 16 async serial, AC power supply	CISCO2511
Cisco 2511-DC[2]	1 Ethernet, 2 serial, 16 async serial, DC power supply	CISCO2511-DC
Cisco 2512[2]	1 Token Ring, 2 serial, 16 async serial, AC power supply	CISCO2512
Cisco 2513	1 Ethernet, 1 Token Ring, 2 serial, AC power supply	CISCO2513
Cisco 2514	2 Ethernet, 2 serial, AC power supply	CISCO2514
Cisco 2514-DC	2 Ethernet, 2 serial, DC power supply	CISCO2514-DC
Cisco 2515	2 Token Ring, 2 serial, AC power supply	CISCO2515
Cisco 2516	14 Ethernet UTP hub ports, 2 sync serial, 1 ISDN BRI, AC power supply	CISCO2516
Cisco 2516-DC	14 Ethernet UTP hub ports, 2 sync serial, 1 ISDN BRI, DC power supply	CISCO2516-DC
Cisco 2517	11 Token Ring UTP hub ports, 2 sync serial, 1 ISDN BRI, AC power supply	CISC02517
Cisco 2518	23 Ethernet UTP hub ports, 2 sync serial, 1 ISDN BRI, AC power supply	CISCO2518
Cisco 2519	23 Token Ring UTP hub ports, 2 sync serial, 1 ISDN BRI, AC power supply	CISCO2519
Cisco 2520	1 Ethernet, 2 high-speed sync serial, 2 low-speed async/sync serial, 1 ISDN BRI interface, AC power supply	CISCO2520
Cisco 2520-DC	1 Ethernet, 2 high-speed sync serial, 2 low-speed async/sync serial, 1 ISDN BRI interface, DC power supply	CISCO2520-DC
Cisco 2520CF[1]	2 high-speed sync serial, 2 low-speed async/sync serial, CFRAD software, AC power supply	CISCO2520CF
Cisco 2520LF[1]	1 Ethernet, 2 high-speed sync serial, 2 low-speed async/sync serial, LAN FRAD software, AC power supply	CISCO2520LF
Cisco 2521	1 Token Ring, 2 high-speed sync serial, 2 low-speed async/sync serial, 1 ISDN BRI interface, AC power supply	CISCO2521

Model	Description	Product Number
Cisco 2521-DC	1 Token Ring, 2 high-speed sync serial, 2 low-speed async/sync serial, 1 ISDN BRI interface, DC power supply	CISCO2521-DC
Cisco 2521CF[1]	2 high-speed sync serial, 2 low-speed async/sync serial, CFRAD software, AC power supply	CISCO2521CF
Cisco 2521LF[1]	1 Token Ring, 2 high-speed sync serial, 2 low-speed async/sync serial, LAN FRAD software, AC power supply	CISCO2521LF
Cisco 2522	1 Ethernet, 2 high-speed sync serial, 8 low-speed async/sync serial, 1 ISDN BRI interface, AC power supply	CISCO2522
Cisco 2522-DC	1 Ethernet, 2 high-speed sync serial, 8 low-speed async/sync serial, 1 ISDN BRI interface, DC power supply	CISCO2522-DC
Cisco 2522CF[1]	2 high-speed sync serial, 8 low-speed async/sync serial, CFRAD software, AC power supply	CISCO2522CF
Cisco 2522LF[1]	1 Ethernet, 2 high-speed sync serial, 8 low-speed async/sync serial, LAN FRAD software, AC power supply	CISCO2522LF
Cisco 2523	1 Token Ring, 2 high-speed sync serial, 8 low-speed async/sync serial, 1 ISDN BRI interface, AC power supply	CISCO2523
Cisco 2523-DC	1 Token Ring, 2 high-speed sync serial, 8 low-speed async/sync serial, 1 ISDN BRI interface, DC power supply	CISCO2523-DC
Cisco 2523CF[1]	2 high-speed sync serial, 8 low-speed async/sync serial, CFRAD software, AC power supply	CISCO2523CF
Cisco 2523LF[1]	1 Token Ring, 2 high-speed sync serial, 8 low-speed async/sync serial, LAN FRAD software, AC power supply	CISCO2523LF
Cisco 2524	1 Ethernet (AUI or 10BaseT) with 3 slots for WAN modules, AC power supply	CISCO2524
Cisco 2524-DC	1 Ethernet (AUI or 10BaseT) with 3 slots for WAN modules, DC power supply	CISCO2524-DC
Cisco 2525	1 Token Ring (STP or UTP) with 3 slots for WAN modules, AC power supply	CISCO2525

1. Mission-specific router. Mission-specific routers are based on standard Cisco 2500 hardware, but they contain less memory and run reduced Cisco IOS images that disable unused ports and support a subset of protocols. By adding software, and possibly memory, mission-specific routers can be upgraded to full standard router functionality.

2. See the chapter "Access Servers," later in this catalog, for more information.

Standard Features

All the Cisco 2500 series models support the features listed in Table 135.

Table 135   Cisco 2500 Series Summary of Features

Characteristic	Feature
Flash memory	All models include a minimum of 4 MB of Flash memory; however, depending on the Cisco IOS release that shipped with the system, it might require more memory. Refer to Table 146 and Table 147, later in this chapter, for the minimum Flash memory required for each feature set.[1]
DRAM memory expandability	All models include the minimum DRAM required by the Cisco IOS release that shipped with the system. Refer to Table 146 and Table 147, later in this chapter, for the minimum DRAM required for each feature set.
Processor type	20-MHz 68030
Choice of software feature sets	IP routing IP routing with IBM base functionality IP/IPX routing IP/IPX/Serial[2] IP/IPX routing with IBM base functionality IP/IPX with IBM base functionality and APPN[3] Desktop Desktop with IBM base functionality Enterprise Enterprise/APPN[3] RMON Mission-specific Cisco 2500 series: application-specific software
Dimensions (H x W x D)	Models 2501 to 2516 and 2520 to 2525: 1.75 x 17.5 x 10.56" (4.44 x 44.45 x 26.82 cm) Models 2517 to 2519: 3.0 x 19.0" (7.62 x 48.26 cm)
Weight (average shipping)	Models 2501 to 2516 and 2520 to 2525: 10 lb (4.5 kg) Models 2517 to 2519: 12.5 lb (5.7 kg)
Standard components	Power supply and cord Console cable kit[4] RJ-45-to-DB-9 adapter 19" rack-mount/wall-mount kit

1. For Cisco IOS Release 11.0 and later, if your system requires more than 4 MB of Flash memory, the additional memory must be ordered separately. For Cisco IOS releases prior to 11.0, the system includes the minimum memory required by the Cisco IOS release that shipped with the system.
2. The IP/IPX/Serial feature set is available with Cisco IOS Release 11.1(3) and later releases for the following Cisco 2500 series models only: 2501, 2502, 2505, 2507, and 2509–2515.
3. This feature set is available with Cisco IOS Release 11.0 and later releases.
4. The console cable kit includes an RJ-45-to-RJ-45 roll-over console cable, an RJ-45-to-DB-25 male DCE adapter, an RJ-45-to-DB-25 female DTE adapter, and an RJ-45-to-DB-9 female DTE adapter.

The environmental specifications for the Cisco 2500 series are listed in Table 136.

Table 136   Cisco 2500 Series Environmental Specifications

Description	Specification
Consumption	For models 2501 to 2525: 40W
Input	For models 2501 to 2516 and 2520 to 2525: 110 to 220 VAC, 50 to 60 Hz –48 VDC For models 2517 to 2519: 90 to 260 VAC, 47 to 63 Hz
Current rating	For models 2501 to 2516 and 2520 to 2525: 1.0 A at 60 Hz, 0.5 A at 50 Hz For models 2517 to 2519: 5.0 A at 60 Hz, 3.5 A at 50 Hz

Description	Specification
Operating temperature range	For models 2501 to 2516 and 2520 to 2525: 32 to 104 F (0 to 40 C) For models 2517 to 2519: 50 to 95 F (10 to 35 C)
Nonoperating temperature range	For models 2501 to 2516 and 2520 to 2525: –40 to 185 F (–40 to 85 C) For models 2517 to 2519: –4 to 185 F (–20 to 85 C)
Humidity (noncondensing)	For models 2501 to 2525: 5 to 95%
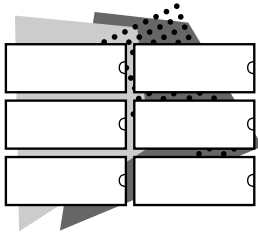
Software Options

The Cisco 2500 series routers support the following software releases:

- Cisco IOS Release 11.1 feature sets: Table 137 and Table 138

- Cisco IOS Release 11.0 feature sets: Table 139

- Cisco IOS Release 10.3 feature sets: Table 140

- Cisco IOS Release 10.2 feature sets: Table 141

- Cisco IOS Release 10.0 feature sets: Table 142

Note that entry-level, mission-specific models are not listed because software is included with the hardware. For more information about mission-specific software, refer to Table 153, Table 154, and Table 155.

Table 137   Cisco IOS Release 11.1 Feature Sets—Cisco 2500 Series

Category	IP Routing	IP/IPX or IP/IPX/Serial[1] Routing	Desktop	Enterprise
LAN support	IP, transparent and translational bridging[2], concurrent routing and bridging, multiring, LAN extension host, GRE	IP, transparent and translational bridging[2], concurrent routing and bridging, multiring, LAN extension host, GRE, Novell IPX	IP, transparent and translational bridging[2], concurrent routing and bridging, multiring, LAN extension host, GRE, Novell IPX, AppleTalk 1 and 2, DECnet IV	IP, transparent and translational bridging[2], concurrent routing and bridging, multiring, LAN extension host, GRE, Novell IPX, AppleTalk 1 and 2, DECnet IV, DECnet V, OSI, XNS, Banyan VINES, Apollo Domain
WAN services	HDLC, PPP[3], X.25[4], Frame Relay, ISDN[5], SMDS, Switched 56	HDLC, PPP[3], X.25[4], Frame Relay, ISDN[5], SMDS, Switched 56, IPXWAN 2.0	HDLC, PPP[3], X.25[4], Frame Relay, ISDN[5], SMDS, Switched 56, IPXWAN 2.0	HDLC, PPP[3], X.25[4], Frame Relay, ISDN[5], SMDS, Switched 56, IPXWAN 2.0
WAN optimization	Header, link, and payload compression[6]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; weighted fair queuing; snapshot routing	Header[7], link, and payload compression[6]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; weighted fair queuing; snapshot routing	Header[7], link, and payload compression[6]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; weighted fair queuing; snapshot routing	Header[7], link and payload compression[6]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; weighted fair queuing; snapshot routing

Category	IP Routing	IP/IPX or IP/IPX/Serial[1] Routing	Desktop	Enterprise
IP routing	RIP, RIP Version 2, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, RIP Version 2, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, RIP Version 2, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, RIP Version 2, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing, ES-IS, IS-IS
Other routing	–	IPX RIP, NLSP	IPX RIP, NLSP, RTMP, AURP, SMRP	IPX RIP, NLSP, RTMP, AURP, SMRP, SRTP
IBM support	Optional[8]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), NetView Native Service Point, QLLC, Bisync, BAN for SNA Frame Relay support	Optional[8]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), NetView Native Service Point, QLLC, Bisync, BAN for SNA Frame Relay support Optional[9]: APPN	Optional[8]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), NetView Native Service Point, QLLC, Bisync, BAN for SNA Frame Relay support	Included: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), NetView Native Service Point, QLLC, Bisync, BAN for SNA Frame Relay support, TG/COS, Downstream PU Concentration (DSPU) Optional[9]: APPN
Management	AutoInstall, SNMP, RMON events and alarms[10], Telnet, automatic modem configuration[11]	AutoInstall, SNMP, RMON events and alarms[10], Telnet, automatic modem configuration[11]	AutoInstall, SNMP, RMON events and alarms[10], Telnet, automatic modem configuration[11]	AutoInstall, SNMP, RMON events and alarms[10], Telnet, automatic modem configuration
Security	Access lists, extended access lists, access security, TACACS+, RADIUS, MD5 routing authentication, Lock and Key, MAC security for hubs[12]	Access lists, extended access lists, access security, TACACS+, RADIUS, MD5 routing authentication, Lock and Key, MAC security for hubs[12]	Access lists, extended access lists, access security, TACACS+, RADIUS, MD5 routing authentication, Lock and Key, MAC security for hubs[12]	Access lists, extended access lists, access security, TACACS+, RADIUS, MD5 routing authentication, Lock and Key, MAC security for hubs[12], Kerberized login
Protocol translation	–	–	–	Telnet, LAT, rlogin, TN3270, X.25, PPP
Remote node[13]	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, NetBEUI over PPP	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, IPXCP[7], NASI[14], NetBEUI over PPP	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, ARAP 1.0/2.0, IPXCP[7], NASI[14], NetBEUI over PPP, MacIP, ATCP	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, IPX and ARAP on virtual async interfaces, ARAP 1.0/2.0, IPXCP[7], NASI[14], NetBEUI over PPP, MacIP, ATCP

Category	IP Routing	IP/IPX or IP/IPX/Serial[1] Routing	Desktop	Enterprise
Terminal services[13]	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD, Xremote, LAT[15], TN3270
Product numbers	See Table 143.	See Table 143.	See Table 143.	See Table 143.

1. The IP/IPX/Serial feature set is available with Cisco IOS Release 11.1(3) and later releases for the following Cisco 2500 series models only: 2501, 2502, 2505, 2507, and 2509–2515.
2. See the category "IBM Support" for information about source-route bridging (SRB).
3. PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, and PPP compression. Multilink PPP is available in Cisco IOS Release 11.0(4) and later releases.
4. Includes X.25 switching.
5. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features. ISDN support is not available for the IP/IPX/Serial software feature set.
6. X.25 and Frame Relay payload compression.
7. IPX header compression (RFC 1553) is available in Cisco IOS Release 11.1(1) and later releases.
8. "Optional" means a separate Cisco IOS feature set with the IBM base option: IP/IBM base, IP/IPX/IBM base, Desktop/IBM base. IBM support is not available for the IP/IPX/Serial software feature set.
9. "Optional" means separate Cisco IOS feature sets: IP/IPX/IBM base/APPN and Enterprise/APPN. APPN support is not available for the IP/IPX/Serial software feature set.
10. The RMON events and alarms groups are supported on all interfaces. Enhanced RMON feature sets are also available. See Table 138.
11. Automatic modem configuration is available for all feature sets in Cisco IOS Release 11.1(2) and later releases. For the Enterprise feature set, automatic modem configuration is available in Cisco IOS Release 11.1(1) and later releases.
12. Applicable to the following Cisco 2500 series Ethernet hub models: Cisco 2505, Cisco 2507, Cisco 2516, and Cisco 2518.
13. Limited support on router auxiliary ports.
14. NASI is available in Cisco IOS Release 11.1(2) and later releases.
15. Use of LAT requires terminal license (FS-L8-10.X= for an 8-user license or FS-L16-10.X= for a 16-user license).

The Remote Monitoring (RMON) MIB (RFC 1757) allows you to monitor all nodes and their interaction on a LAN segment. Standard Cisco IOS Release 11.1 feature sets provide support for the RMON alarm and event groups only. If you prefer more network management support, you can order an enhanced RMON feature set that includes full support for the following nine groups: statistics, history, alarms, hosts, hostTopN, matrix, filter, capture, and events. Table 138 describes the contents of the enhanced IP/RMON, IP/IPX/RMON, and Enterprise/RMON feature sets.

Table 138   Cisco IOS Release 11.1 Feature Sets—RMON

Category	IP/RMON Routing[1]	IP/IPX/RMON Routing[1]	Enterprise/RMON[1]
LAN support	IP, transparent and translational bridging[2], concurrent routing and bridging, multiring, LAN extension host, GRE	IP, transparent and translational bridging[2], concurrent routing and bridging, multiring, LAN extension host, GRE, Novell IPX	IP, transparent and translational bridging[2], concurrent routing and bridging, multiring, LAN extension host, GRE, Novell IPX, AppleTalk Phase1 and 2, DECnet IV, DECnet V, OSI, XNS, Banyan VINES, Apollo Domain
WAN services	HDLC, PPP[3], X.25[4], Frame Relay, ISDN[5], SMDS, Switched 56	HDLC, PPP[3], X.25[4], Frame Relay, ISDN[5], SMDS, Switched 56, IPXWAN 2.0	HDLC, PPP[3], X.25[4], Frame Relay, ISDN[5], SMDS, Switched 56, IPXWAN 2.0
WAN optimization	Header, link, and payload compression[6]; dial-on-demand, dial backup, bandwidth-on-demand, custom and priority queueing, weighted fair queuing, snapshot routing	Header[7], link, and payload compression[6]; dial-on-demand, dial backup, bandwidth-on-demand, custom and priority queueing, weighted fair queuing, snapshot routing	Header[7], link, and payload compression[6]; dial-on-demand, dial backup, bandwidth-on-demand, custom and priority queueing, weighted fair queuing, snapshot routing

Category	IP/RMON Routing[1]	IP/IPX/RMON Routing[1]	Enterprise/RMON[1]
IP routing	RIP, RIP Version 2, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, RIP Version 2, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, RIP Version 2, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing, ES-IS, IS-IS
Other routing	–	IPX RIP, NLSP	IPX RIP, NLSP, RTMP, AURP, SMRP, SRTP
IBM support	Optional[8]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SLDC transport (STUN), Frame Relay SNA Support (RFC1490), NetView Native Service Point, QLLC, Bisync, BAN for SNA Frame Relay support	Optional[8]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SLDC transport (STUN), Frame Relay SNA Support (RFC1490), NetView Native Service Point, QLLC, Bisync, BAN for SNA Frame Relay support	Optional[8]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SLDC transport (STUN), Frame Relay SNA Support (RFC1490), NetView Native Service Point, QLLC, Bisync, BAN for SNA Frame Relay support, TG/COS, Downstream PU Concentration (DSPU)
Management	AutoInstall, SNMP, RMON nine-group Ethernet[9], Telnet, automatic modem configuration	AutoInstall, SNMP, RMON nine-group Ethernet[9], Telnet, automatic modem configuration	AutoInstall, SNMP, RMON nine-group Ethernet[9], Telnet, automatic modem configuration
Security	Access lists, extended access lists, access security, TACACS+, RADIUS, MD5 routing authentication, Lock and Key, MAC security for hubs[10]	Access lists, extended access lists, access security, TACACS+, RADIUS, MD5 routing authentication, Lock and Key, MAC security for hubs[10]	Access lists, extended access lists, access security, TACACS+, RADIUS, MD5 routing authentication, Lock and Key, MAC security for hubs[10], Kerberized login
Protocol translation	–	–	Telnet LAT, rlogin, TN3270, X.25, PPP
Remote node[11]	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, NetBEUI over PPP	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, IPX on virtual asynch interfaces, IPXCP[7], NASI[12], NetBEUI over PPP	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, IPX on virtual asynch interfaces, IPXCP[7], NASI[12], NetBEUI over PPP, MacIP, ATCP
Terminal Services[11]	Telnet, rlogin, X.25, PAD	Telnet, rlogin, X.25, PAD	Telnet, rlogin, X.25, PAD, XRemote, LAT[13], TN3270

1. The IP/RMON, IP/IPX/RMON, and Enterprise/RMON feature sets are supported on the following Cisco 2500 series routers: 2501, 2503, 2505, 2507, 2509, 2511, 2513, 2514, 2516, 2518, 2520, and 2522. These features sets are also supported on AS5100 and AS5200 access servers.
2. See the category "IBM support" for information about SRB.
3. PPP includes support for the LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, PPP compression, and Multilink PPP.
4. Includes X.25 switching.
5. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable "WAN optimization" features.
6. X.25 and Frame Relay payload compression.
7. IPX header compression (RFC 1553) as of Cisco IOS Release 11.1(1).
8. "Optional" means a separate Cisco IOS feature set with the IBM base option: IP/IBM base, IP/IPX/IBM base, Desktop/IBM base.
9. The RMON events and alarms groups are supported for all interfaces; however, the full nine groups are supported for Ethernet interfaces only. For security reasons, packet capture only captures packet headers, not data.
10. Applies to the following Cisco 2500 series Ethernet hubs: 2505, 2507, 2516, and 2518.
11. Supported on access servers (with limited support on router auxiliary ports).
12. NASI is available in Cisco IOS Release 11.1(2) and later releases.
13. Use of LAT requires terminal license (FS-L8-10.X= for an 8-user license or FS-L16-10.X= for a 16-user license).

Table 139   Cisco IOS Release 11.0 Feature Sets—Cisco 2500 Series

Category	IP Routing	IP/IPX Routing	Desktop	Enterprise
LAN support	IP, transparent and translational bridging[1], concurrent routing and bridging, multiring, LAN extension host, GRE	IP, transparent and translational bridging[1], concurrent routing and bridging, multiring, LAN extension host, GRE, Novell IPX	IP, transparent and translational bridging[1], concurrent routing and bridging, multiring, LAN extension host, GRE, Novell IPX, AppleTalk 1 and 2, DECnet IV	IP, transparent and translational bridging[1], concurrent routing and bridging, multiring, LAN extension host, GRE, Novell IPX, AppleTalk 1 and 2, DECnet IV, DECnet V, OSI, XNS, Banyan VINES, Apollo Domain
WAN serial support	Dual synchronous	Dual synchronous	Dual synchronous	Dual synchronous
WAN services	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], SMDS, Switched 56	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], SMDS, Switched 56, IPXWAN 2.0	HDLC, PPP[2], X.25[3],Frame Relay, ISDN[4], SMDS, Switched 56, IPXWAN 2.0	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], SMDS, Switched 56, IPXWAN 2.0
WAN optimization	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; weighted fair queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; weighted fair queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; weighted fair queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; weighted fair queuing; snapshot routing
IP routing	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing, ES-IS, IS-IS
Other routing	–	IPX RIP, NLSP	IPX RIP, NLSP, RTMP, AURP, SMRP	IPX RIP, NLSP, RTMP, AURP, SMRP, SRTP
IBM support	Optional[6]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), NetView Native Service Point, QLLC[7], Bisync[7]	Optional[6]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), NetView Native Service Point, QLLC[8], Bisync[8]	Optional[6]: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), NetView Native Service Point, QLLC[8], Bisync[8]	Included: SRB/RSRB, SRT, DLSw+, SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering, SDLC integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), NetView Native Service Point, QLLC, Bisync, TG/COS, Downstream PU Concentration (DSPU)
		Optional[9]: APPN		Optional[9]: APPN
Management	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet
Security	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication
Protocol translation	–	–	–	Telnet, LAT, rlogin, TN3270, X.25, PPP

Category	IP Routing	IP/IPX Routing	Desktop	Enterprise
Remote node[10]	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, IPXCP	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, IPXCP, ARAP 1.0/2.0, IPXCP, MacIP, ATCP	SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, IPX and ARAP on virtual async interfaces, ARAP 1.0/2.0, IPXCP, MacIP, ATCP
Terminal services[10]	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD, Xremote, LAT[11], TN3270
Product numbers	See Table 143.	See Table 143.	See Table 143.	See Table 143.

1. See the category "IBM Support" for information about source-route bridging (SRB).

2. PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, and PPP compression. Multilink PPP is available in Cisco IOS Release 11.0(4) and later releases.

3. Includes X.25 switching.

4. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.

5. X.25 payload compression. Frame Relay payload compression is available in Cisco IOS Release 11.0(4) and later releases.

6. "Optional" means a separate Cisco IOS feature set with the IBM base option: IP/IBM base, IP/IPX/IBM base, Desktop/IBM base.

7. QLLC and Bisync are available in IP/IBM base in Cisco IOS Release 11.0(3) and later.

8. QLLC and Bisync are available in IP/IPX/IBM base and Desktop/IBM base in Cisco IOS Release 11.0(2) and later.

9. "Optional" means separate Cisco IOS feature sets: IP/IPX/IBM base/APPN and Enterprise/APPN.

10. Limited support on router auxiliary ports.

11. Use of LAT requires terminal license (FS-L8-10.X= for an 8-user license or FS-L16-10.X= for a 16-user license).

Table 140   Cisco IOS Release 10.3 Feature Sets—Cisco 2500 Series

Category	IP Routing	IP/IPX Routing	Desktop	Enterprise
LAN support	IP, transparent and translational bridging[1], multiring, LAN extension host	IP, transparent and translational bridging[1], multiring, LAN extension host, Novell IPX	IP, transparent and translational bridging[1], multiring, LAN extension host, Novell IPX, AppleTalk 1 and 2, DECnet IV	IP, transparent and translational bridging[1], multiring, LAN extension host, Novell IPX, AppleTalk 1 and 2, DECnet IV, DECnet V, OSI, XNS, Banyan VINES, Apollo Domain
WAN services	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], SMDS, Switched 56	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], SMDS, Switched 56, IPXWAN 2.0	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], SMDS, Switched 56, IPXWAN 2.0	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], SMDS, Switched 56, IPXWAN 2.0
WAN optimization	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; snapshot routing
IP routing	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, ES-IS, IS-IS
Other routing	–	IPX RIP, NLSP	IPX RIP, RTMP, AURP,	IPX RIP, RTMP, AURP, SRTP

Category	IP Routing	IP/IPX Routing	Desktop	Enterprise
IBM support	Optional[6]: SRB/RSRB; SRT; DLSw+[7]; SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering; SDLC integration; SDLC-to-LAN conversion (SDLLC); SDLC transport (STUN); Frame Relay SNA Support (RFC 1490)	Optional[6]: SRB/RSRB, SRT, DLSw+[7]; SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering; SDLC integration; SDLC-to-LAN conversion (SDLLC); SDLC transport (STUN); Frame Relay SNA Support (RFC 1490)	Optional[6]: SRB/RSRB; SRT, DLSw+[7]; SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering; SDLC integration; SDLC-to-LAN conversion (SDLLC); SDLC transport (STUN); Frame Relay SNA Support (RFC 1490)	Included: SRB/RSRB; SRT; DLSw+[7]; SNA and NetBIOS WAN optimization via local acknowledgment, caching and filtering; SDLC integration; SDLC-to-LAN conversion (SDLLC); SDLC transport (STUN); Frame Relay SNA Support (RFC 1490); TG/COS; QLLC; Downstream PU Concentration (DSPU)
Management	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet
Security	Access lists, extended access lists, access security, TACACS+	Access lists, extended access lists, access security, TACACS+	Access lists, extended access lists, access security, TACACS+	Access lists, extended access lists, access security, TACACS+
Protocol translation	–	–	–	Telnet, LAT, rlogin, TN3270, X.25, PPP
Remote node[8]	SLIP, PPP, CSLIP, CPPP, DHCP[9]	SLIP, PPP, CSLIP, CPPP, DHCP[9], IPXCP	SLIP, PPP, CSLIP, CPPP, ARAP 1.0/2.0, IPXCP, MacIP, ATCP[9], DHCP[9]	SLIP, PPP, CSLIP, CPPP, ARAP 1.0/2.0, IPXCP, MacIP, ATCP[9], DHCP[9]
Terminal services[8]	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD, Xremote, LAT[10], TN3270
Product numbers	See Table 143.	See Table 143.	See Table 143.	See Table 143.

1. See the category "IBM Support" in this table for information about source-route bridging (SRB).
2. PPP includes support for LAN protocols supported by the feature set, PAP and CHAP authentication, and PPP compression.
3. Includes X.25 switching.
4. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.
5. X.25 payload compression.
6. "Optional" means a separate Cisco IOS feature set with the IBM base option: IP/IBM base, IP/IPX/IBM base, or Desktop/IBM base.
7. DLSw+ is supported with Cisco IOS Release 10.3(2) and later releases.
8. Supported on access servers (with limited support on router auxiliary ports).
9. ATCP and DHCP proxy client is supported in Cisco IOS Release 10.3(3) and later releases.
10. Use of LAT requires terminal license (FS-L8-10.X= for an 8-user license or FS-L16-10.X= for a 16-user license).

Table 141   Cisco IOS Release 10.2 Feature Sets—Cisco 2500 Series

Category	IP Routing	IP/IPX Routing[1]	Desktop	Enterprise
LAN support	IP; transparent, translational, and source-route bridging; LAN extension host	IP; transparent, translational, and source-route bridging; LAN extension host; Novell IPX	IP; transparent, translational, and source-route bridging; LAN extension host; Novell IPX; AppleTalk Phase 1 and 2; DECnet IV	IP; transparent, translational, and source-route bridging; LAN extension host; Novell IPX; AppleTalk Phase 1 and 2; DECnet IV; DECnet V; XNS; Banyan VINES; OSI; Apollo Domain
WAN services	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], SMDS, Switched 56	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], IPXWAN SMDS, Switched 56	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], IPXWAN, SMDS, Switched 56	HDLC, PPP[2], X.25[3], Frame Relay, ISDN[4], IPXWAN, SMDS, Switched 56

Category	IP Routing	IP/IPX Routing[1]	Desktop	Enterprise
WAN optimization	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; snapshot routing	Header, link, and payload compression[5]; dial-on-demand; dial backup; bandwidth-on-demand; custom and priority queuing; snapshot routing
IP routing	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, ES-IS, IS-IS
Other routing	–	IPX RIP	IPX RIP, RTMP, AURP	IPX RIP, RTMP, AURP, SRTP
IBM support	Optional[6]: RSRB; SNA and NetBIOS WAN optimization via local acknowledgment, caching, and filtering[7]	Optional[6]: RSRB; SNA and NetBIOS WAN optimization via local acknowledgment, caching, and filtering[8]	Optional[6]: RSRB; SNA and NetBIOS WAN optimization via local acknowledgment, caching, and filtering[9]	Included: RSRB; SNA and NetBIOS WAN optimization via local acknowledgment, caching, and filtering; SDLC integration; SDLC-to-LAN conversion (SDLLC); SDLC transport (STUN); TG/COS; QLLC
Management	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet
Security	Access lists, extended access lists, access security, TACACS	Access lists, extended access lists, access security, TACACS	Access lists, extended access lists, access security, TACACS	Access lists, extended access lists, access security, TACACS
Protocol translation	–	–	–	Telnet, LAT, rlogin, TN3270, X.25
Remote node[10]	SLIP, PPP, CSLIP, CPPP	SLIP, PPP, CSLIP, CPPP, IPXCP	SLIP, PPP, CSLIP, CPPP, ARAP 1.0/2.0, IPXCP, MacIP	SLIP, PPP, CSLIP, CPPP, ARAP 1.0/2.0, IPXCP, MacIP
Terminal services[10]	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD, Xremote, LAT[11], TN3270
Product numbers	See Table 143.	See Table 143.	See Table 143.	See Table 143.

1. Only available with Cisco IOS Release 10.2(2) and later releases.
2. PPP includes support for LAN protocols supported by the feature set, address negotiation, and PAP and CHAP authentication.
3. Includes X.25 switching.
4. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization.
5. X.25 payload compression.
6. "Optional" means a separate Cisco IOS feature set with the IBM base option: IP/IBM base, IP/IPX/IBM base, or Desktop/IBM base.
7. To obtain the IBM base functionality option with the IP routing feature set, order product number SF25CS-10.2.2 or later.
8. To obtain the IBM base functionality option with the IP/IPX routing feature set, order product number SF25DS-10.2.2 or later.
9. To obtain the IBM base functionality option with the Desktop feature set, order product number SF25BS-10.2.2 or later.
10. Supported on access servers (with limited support on router auxiliary ports).
11. Use of LAT requires terminal license (FS-L8-10.X= for an 8-user license or FS-L16-10.X= for a 16-user license).

Table 142   Cisco IOS Release 10.0 Feature Sets—Cisco 2500 Series

Category	IP Routing	Desktop	Enterprise
LAN support	IP; transparent, translational, and source-route bridging	IP; Novell IPX; transparent, translational, and source-route bridging; AppleTalk 1 and 2; DECnet IV	IP; transparent, translational, and source-route bridging; Novell IPX; AppleTalk 1 and 2; DECnet IV; DECnet V; OSI; XNS; Banyan VINES; Apollo Domain
WAN services	HDLC, PPP[1], X.25[2], Frame Relay, ISDN[3], Switched 56	HDLC, PPP[1], X.25[2], Frame Relay, ISDN[3], IPXWAN, Switched 56	HDLC, PPP[1], X.25[2], Frame Relay, ISDN[3], IPXWAN, SMDS, Switched 56
WAN optimization	Header and link compression, dial-on-demand, dial backup, bandwidth-on-demand, custom and priority queuing, snapshot routing	Header and link compression, dial-on-demand, dial backup, bandwidth-on-demand, custom and priority queuing, snapshot routing	Header and link compression, dial-on-demand, dial backup, bandwidth-on-demand, custom and priority queuing, snapshot routing
IP routing	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP	RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, ES-IS, IS-IS
Other routing	–	IPX RIP, RTMP	IPX RIP, RTMP, SRTP
IBM support	RSRB; SNA and NetBIOS WAN optimization via local acknowledgment, caching, and filtering	RSRB; SNA and NetBIOS WAN optimization via local acknowledgment, caching, and filtering	RSRB; SNA and NetBIOS WAN optimization via local acknowledgment, caching, and filtering; SDLLC Integration; SDLC-to-LAN conversion (SDLLC); SDLC transport (STUN); TG/COS
Management	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet
Security	Access lists, access security, TACACS	Access lists, access security, TACACS	Access lists, access security, TACACS
Protocol translation	–	–	Telnet, LAT, rlogin, TN3270, X.25
Remote node[4]	SLIP, CSLIP, PPP, CPPP	SLIP, CSLIP, PPP, CPPP, ARAP 1.0, IPXCP, MacIP	SLIP, CSLIP, PPP, CPPP, ARAP 1.0, IPXCP, MacIP
Terminal services[4]	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD	Telnet, rlogin, X.25 PAD, XRemote, LAT[5], TN 3270
Product numbers	See Table 143.	See Table 143.	See Table 143.

1. PPP includes support for LAN protocols supported by the feature set, PAP and CHAP authentication, and PPP compression.
2. Includes X.25 switching.
3. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.
4. Supported on access servers (with limited support on router auxiliary ports).
5. Use of LAT requires terminal license (FS-L8-10.X= for an 8-user license or FS-L16-10.X= for a 16-user license).

Table 143 lists the software feature set product numbers for Cisco IOS Releases 11.1, 11.0, 10.3, and 10.2.

Note   All models include a minimum of 4 MB of Flash memory; however, depending on the Cisco IOS release feature set that you order with the system, it might require more memory. Refer to Table 146 and Table 147, later in this chapter, for the minimum Flash memory required for each feature set. Refer to Table 149 for ordering information.

Table 143   Cisco IOS Product Numbers—Cisco 2500 Series

Description	Product Number[1]
IP	SF25C-xx.x.x SW25C-xx.x.x=
IP with IBM base	SF25CS-xx.x.x SW25CS-xx.x.x=
IP/IPX	SF25D-xx.x.x SW25D-xx.x.x=
IP/IPX with IBM base	SF25DS-xx.x.x SW25DS-xx.x.x=
IP/IPX with IBM base and APPN	SF25DSN-xx.x.x SW25DSN-xx.x.x=
Desktop	SF25B-xx.x.x SW25B-xx.x.x=
Desktop with IBM base	SF25BS-xx.x.x SW25BS-xx.x.x=
Enterprise	SF25A-xx.x.x SW25A-xx.x.x=
Enterprise with APPN	SF25AN-xx.x.x SW25AN-xx.x.x=
IP and RMON	SF25CR-xx.x.x SW25CR-xx.x.x=
IP with IBM and RMON	SF25CSR-xx.x.x SW25CSR-xx.x.x=
IP/IPX and RMON	SF25DR-xx.x.x SW25DR-xx.x.x=
IP/IPX with IBM and RMON	SF25DSR-xx.x.x SF25DSR-xx.x.x=
Enterprise and RMON	SF25AR-xx.x.x SW25AR-xx.x.x=

1. Substitute the release number for xx.x.x in the product number (for example, SW-25C-11.1.1=).

Feature sets for Cisco IOS Releases 11.1, 11.0, 10.3, and 10.2 can be upgraded as described in Table 144. To order an upgrade, you must use two product numbers; one represents the upgrade license and the other represents the software. For example, to upgrade from an IP feature set to an IP feature set with IBM base functionality, order product number FRAP-CCS= (the upgrade license) and SWAPCS-xx.x.x= (the software). To upgrade to a feature set with APPN, you must first purchase the upgrade license for the desired feature set and then purchase the upgrade license and upgrade software for the APPN feature set.

For additional details about how to order Cisco 2500 series software updates and upgrades, see the section "Software Ordering Examples" in the chapter "Cisco IOS Software."

Table 144   Cisco IOS Upgrades—Cisco 2500 Series

Feature Set Upgrade	Product Number[1]
IP to IP with IBM base functionality	FR25-CCS= and SW25CS-xx.x.x=
IP to IP/IPX	FR25-CD= and SW25D-xx.x.x=
IP to IP/IPX with IBM base functionality	FR25-CDS= and SW25DS-xx.x.x=
IP to IP/IPX with IBM base functionality and APPN	FR25-CDS=, FR25-APPN=, and SW25DSN-xx.x.x=
IP to Desktop	FR25-CB= and SW25B-xx.x.x=
IP to Desktop with IBM base functionality	FR25-CBS= and SW25BS-xx.x.x=
IP to Enterprise	FR25-CA= and SW25A-xx.x.x=
IP to Enterprise and APPN	FR25-CA=, FR25-APPN=, and SW25AN-xx.x.x=
IP with IBM base to IP/IPX with IBM base functionality	FR25-CSDS= and SW25DS-xx.x.x=
IP with IBM base to IP/IPX with IBM base functionality and APPN	FR25-CSDS=, FR25-APPN=, and SW25DSN-xx.x.x=
IP with IBM base to Desktop with IBM base functionality	FR25-CSBS= and SW25BS-xx.x.x=
IP with IBM base to Enterprise	FR25-CSA= and SW25A-xx.x.x=
IP with IBM base to Enterprise and APPN	FR25-CSA=, FR25-APPN=, and SW25AN-xx.x.x=
IP/IPX to IP/IPX with IBM base functionality	FR25-DDS= and SW25DS-xx.x.x=
IP/IPX to IP/IPX with IBM base functionality and APPN	FR25-DDS=, FR25-APPN=, and SW25DSN-xx.x.x=
IP/IPX to Desktop	FR25-DB= and SW25B-xx.x.x=
IP/IPX to Desktop with IBM base functionality	FR25-DBS= and SW25BS-xx.x.x=
IP/IPX to Enterprise	FR25-DA= and SW25A-xx.x.x=
IP/IPX to Enterprise and APPN	FR25-DA=, FR25-APPN=, and SW25AN-xx.x.x=
IP/IPX with IBM base to Desktop with IBM base functionality	FR25-DSBS= and SW25BS-xx.x.x=
IP/IPX with IBM base to Enterprise	FR25-DSA= and SW25A-xx.x.x=
IP/IPX with IBM base to Enterprise and APPN	FR25-DSA=, FR25-APPN=, and SW25AN-xx.x.x=

Feature Set Upgrade	Product Number[1]
IP/IPX with IBM base to IP/IPX with IBM base and APPN	FR25-APPN= and SW25DSN-xx.x.x=
Desktop to Desktop with IBM base functionality	FR25-BBS= and SW25BS-xx.x.x=
Desktop to Enterprise	FR25-BA= and SW25A-xx.x.x=
Desktop to Enterprise and APPN	FR25-BA=, FR25-APPN=, and SW25AN-xx.x.x=
Desktop with IBM base to Enterprise	FR25-BSA= and SW25A-xx.x.x=
Desktop with IBM base to Enterprise and APPN	FR25-BSA=, FR25-APPN=, and SW25AN-xx.x.x=
IP to IP/RMON	FR25-RMON= and SW25CR-x.x.x=
IP to IP/IBM/RMON	FR25-CCS=, FR25-RMON=, and SW25CSR-x.x.x=
IP to IP/IPX/RMON	FR25-CD=, FR25-RMON=, and SW25DR-x.x.x=
IP to IP/IPX/IBM/RMON	FR25-CDS=, FR25-RMON=, and SW25DSR-x.x.x=
IP to Enterprise/RMON	FR25-CA=, FR25-RMON=, and SW25AR-x.x.x=
IP/RMON to IP/IBM/RMON	FR25-CCS= and SW25CSR-x.x.x=
IP/RMON to IP/IPX/RMON	FR25-CD= and SW25DR-x.x.x=
IP/RMON to IP/IPX/IBM/RMON	FR25-CDS= and SW25DSR-x.x.x=
IP/RMON to Enterprise/RMON	FR25-CA= and SW25AR-x.x.x=
IP/IBM to IP/IBM/RMON	FR25-RMON= and SW25CSR-x.x.x=
IP/IBM to IP/IPX/IBM/RMON	FR25-CSDS=, FR25-RMON=, and SW25DSR-x.x.x=
IP/IBM to Enterprise/RMON	FR25-CSA=, FR25-RMON=, and SW25AR-x.x.x=
IP/IBM/RMON to IP/IPX/IBM/RMON	FR25-CSDS= and SW25DSR-x.x.x=
IP/IBM/RMON to Enterprise/RMON	FR25-CSA= and SW25AR-x.x.x=
IP/IPX to IP/IPX/RMON	FR25-RMON= and SW25DR-x.x.x=
IP/IPX to IP/IPX/IBM/RMON	FR25-DDS=, FR25-RMON=, and SW25DSR-x.x.x=
IP/IPX to Enterprise/RMON	FR25-CSA=, FR25-RMON=, and SW25AR-x.x.x=
IP/IPX/RMON to IP/IPX/IBM/RMON	FR25-DDS= and SW25DSR-x.x.x=
IP/IPX/RMON to Enterprise/RMON	FR25-DA= and SW25AR-x.x.x=
IP/IPX/IBM to IP/IPX/IBM/RMON	FR25-RMON= and SW25DSR-x.x.x=
IP/IPX/IBM to Enterprise/RMON	FR25-DSA=, FR25-RMON=, and SW25AR-x.x.x=
IP/IPX/IBM/RMON to Enterprise/RMON	FR25-DSA= and SW25AR-x.x.x=
Desktop to Enterprise/RMON	FR25-BA=, FR25-RMON=, and SW25AR-x.x.x=

Feature Set Upgrade	Product Number[1]
Desktop/IBM to Enterprise/RMON	FR25-BSA=, FR25-RMON=, and SW25AR-x.x.x=
Enterprise to Enterprise/RMON	FR25-RMON= and SW25AR-x.x.x=

1. For Cisco IOS Release 11.1, 11.0, 10.3, and 10.2, substitute the release number for xx.x.x in the product number (for example, SW25D-11.1.1=).

Table 145   Cisco IOS Release 10.0 Software Upgrades—Cisco 2500 Series

Upgrade[1]	Product Number
IP to Desktop[2]	SW25-10.0.xCB=
IP to Enterprise[3]	SW25-10.0.xCA=
Desktop to Enterprise[3]	SW25-10.0.xBA=

1. A minimum of 4-MB Flash memory is required for all feature sets.
2. Requires a minimum of 4-MB DRAM.
3. Requires a minimum of 6-MB DRAM.

Adding a feature set may require you to purchase additional memory. Table 146 lists the minimum memory requirements for Cisco IOS Release 11.1 and 11.0 feature sets; Table 147 lists the requirements for Cisco IOS Release 10.3, 10.2, and 10.0 feature sets. The minimum memory requirements listed were chosen for typical branch and remote office applications. If your network is very large, using complex routing protocols, or using RMON, you may need more memory. Configuration analysis and testing are encouraged.

Table 146   Cisco 2500 Series Minimum Memory Requirements for Cisco IOS Release 11.1 and 11.0 Feature Sets

Feature Set	Cisco IOS Release 11.1			Cisco IOS Release 11.0		
	Flash Memory	Total DRAM Memory[1]—Models 2501–2516 and 2520–2525	Total DRAM Memory[1]—Models 2517–2519	Flash Memory	Total DRAM Memory[1]—Models 2501–2516 and 2520–2525	Total DRAM Memory[1]—Models 2517–2519
IP	4 MB	2 MB[2]	2 MB	4 MB	2 MB[2]	2 MB
IP with IBM base	8 MB	4 MB	6 MB	8 MB	4 MB	6 MB
IP/IPX	8 MB	4 MB	6 MB	4 MB	4 MB	6 MB
IP/IPX/Serial	4 MB	4 MB	6 MB	–	–	–
IP/IPX with IBM base	8 MB	4 MB	6 MB	8 MB	4 MB	6 MB
IP/IPX with IBM base and APPN	8 MB	8 MB	6 MB	8 MB	8 MB	6 MB
Desktop	8 MB	4 MB	6 MB	8 MB	4 MB	6 MB
Desktop with IBM base	8 MB	4 MB	6 MB	8 MB	4 MB	6 MB
Enterprise	8 MB	6 MB	6 MB	8 MB	6 MB	6 MB
Enterprise and APPN	16 MB	8 MB	6 MB	8 MB	8 MB	6 MB
ISDN	4 MB	2 MB	–	4 MB	2 MB	–

Feature Set	Cisco IOS Release 11.1			Cisco IOS Release 11.0		
	Flash Memory	Total DRAM Memory[1]— Models 2501–2516 and 2520–2525	Total DRAM Memory[1]— Models 2517–2519	Flash Memory	Total DRAM Memory[1]— Models 2501–2516 and 2520–2525	Total DRAM Memory[1]— Models 2517–2519
CFRAD	4 MB	2 MB[2]	–	4 MB	2 MB[2]	–
LAN FRAD	4 MB	4 MB	–	4 MB	4 MB	–
IP and RMON[3]	4 MB	4 MB	6 MB	–	–	–
IP with IBM base and RMON[3]	8 MB	4 MB	6 MB	–	–	–
IP/IPX and RMON[3]	8 MB	4 MB	6 MB	–	–	–
IP/IPX with IBM base and RMON[3]	8 MB	4 MB	6 MB	–	–	–
Enterprise and RMON[3]	8 MB	6 MB	6 MB	–	–	–

1. The total DRAM memory is the total combined primary and shared DRAM memory. See Table 148.

2. The Cisco 2522 and Cisco 2523 require 4-MB DRAM. All other models require 2-MB DRAM.

3. An Ethernet segment with 50 nodes and 10 hosts or more requires more memory, particularly when promiscuous rather than native mode is chosen. In native mode, only the packets traversing the router are monitored. In promiscuous mode, everything on the Ethernet segment is monitored.

Table 147   Cisco 2500 Series Minimum Memory Requirements for Cisco IOS Release 10.3, 10.2, and 10.0 Feature Sets

| Feature Set	Cisco IOS Release 10.3[1]		Cisco IOS Release 10.2[1]		Cisco IOS Release 10.0[1]	
	Flash Memory	Total DRAM Memory	Flash Memory	Total DRAM Memory	Flash Memory	Total DRAM Memory
IP	4 MB	2 MB	4 MB	2 MB	4 MB	2 MB
IP with IBM base	4 MB	4 MB	4 MB	4 MB	–	–
IP/IPX	4 MB	4 MB	4 MB	4 MB	–	–
IP/IPX with IBM base	8 MB	4 MB	4 MB	4 MB	–	–
IP/IPX with IBM base and APPN	–	–	–	–	–	–
Desktop	4 MB	4 MB	4 MB	4 MB	4 MB	4 MB
Desktop with IBM base	8 MB	4 MB	4 MB	4 MB	–	–
Enterprise	8 MB	6 MB	8 MB	6 MB	4 MB	6 MB
Enterprise and APPN	–	–	–	–	–	–
ISDN	4 MB	2 MB	4 MB	2 MB	–	–
CFRAD	4 MB	2 MB	4 MB	2 MB	–	–

1. The total DRAM memory is the total combined primary and shared DRAM memory. See Table 148.

There are two types of DRAM memory in the Cisco 2500 series routers: primary and shared (packet). Primary memory is used to store the operating configuration, routing tables, caches, queues, and packets. Shared memory is used to store incoming and outgoing packets. In Table 148, the physical configuration column lists the amount of fixed DRAM and DRAM SIMM memory supported. The system usage column lists how the system allocates the total DRAM memory installed.

Table 148   Shared and Primary DRAM Memory—Cisco 2500 Series

Total DRAM Memory	Physical Configuration		System Usage	
	Fixed DRAM[1]	DRAM SIMM	Shared DRAM Memory	Primary DRAM Memory
2 MB	2 MB	–	1 MB	1 MB
4 MB	–	4 MB	2 MB	2 MB
6 MB	2 MB	4 MB	2 MB	4 MB
8 MB	–	8 MB	2 MB	6 MB
10 MB	2 MB	8 MB	2 MB	8 MB
16 MB	–	16 MB	2 MB	14 MB
18 MB	2 MB	16 MB	2 MB	16 MB

1. Fixed DRAM is soldered on the system card. Depending on the Cisco IOS feature originally ordered, the system may or may not include fixed DRAM.
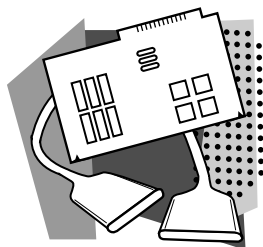
Hardware Options

The hardware options for Cisco 2500 series routers include additional rack-mount kits, memory, and cables. In Table 149 and Table 150, if a product number ends with an equal sign (=), you can order the item as a spare only. If a product number does not end with an equal sign, you can order the item as a spare or as a configurable part of a system order.

All Cisco 2500 models include a minimum of 4 MB of Flash memory; however, depending on the Cisco IOS software release shipped with the system, it might require more memory. Additional Flash memory can be purchased to allow for dual banking or potential future code growth.

The Cisco 2500 series routers also come with a 19-inch rack-mount kit and a console cable kit (which includes a RJ-45-to-RJ-45 roll-over console cable, an RJ-45-to-DB-25 male DCE adapter, an RJ-45-to-DB-25 female DTE adapter, and a DB-9 adapter).

Note   For more information, including cable illustrations, refer to the chapter "Cables and Transceivers." The chapter "Power Cords" provides international power cord product numbers.

Table 149   Cisco 2500 Series Hardware Options

Option	Product Number
19" rack-mount kit[1]	ACS-2500RM-19=
24" rack-mount kit	A25-2500RM-24=
Boot ROM upgrade	BOOT-2500=
4-MB DRAM	MEM-1X4D
4-MB DRAM (spare)	MEM-1X4D=
8-MB DRAM	MEM-1X8D
8-MB DRAM (spare)	MEM-1X8D=
16-MB DRAM	MEM-1X16D
16-MB DRAM (spare)	MEM-1X16D=
4-MB Flash SIMM	MEM-1X4F
4-MB Flash SIMM (spare)	MEM-1X4F=
8-MB Flash SIMM	MEM-1X8F
8-MB Flash SIMM (spare)	MEM-1X8F=
4- to 8-MB Flash SIMM upgrade[2]	MEM-1X8F-U
4- to 8-MB Flash SIMM upgrade[3]	MEM-1X8F-DFB-U
8-MB dual-bank Flash SIMM[4] (spare)	MEM-1X8F-DFB=
16-MB dual-bank Flash SIMM[5]	MEM-1X16F-DFB
16-MB dual-bank Flash SIMM[5] (spare)	MEM-1X16F-DFB=
2-wire switched 56-kbps CSU/DSU module (for Cisco 2524 and Cisco 2525 routers only)	SM25-56K2
4-wire 56/64-kbps DSU/CSU module (for Cisco 2524 and Cisco 2525 routers only)	SM25-56K4
Fractional T1/T1 DSU/CSU module (for Cisco 2524 and Cisco 2525 routers only)	SM25-T1
Five-in-one synchronous serial module (for Cisco 2524 and Cisco 2525 routers only)	SM25-5IN1

Option	Product Number
ISDN BRI module (for Cisco 2524 and Cisco 2525 routers only)	SM25-BRI-S/T
ISDN with integrated network termination 1 (NT1) device module (for Cisco 2524 and Cisco 2525 routers only)	SM25-BRI-U
Blank slot cover (for Cisco 2524 and Cisco 2525 routers only)	SM25-BLANK

1. The 19-inch rack-mount kit can only be ordered as a spare; a 19-inch rack-mount kit is included with all Cisco 2500 series routers. An optional 24-inch rack-mount kit can be ordered from Cisco Systems.
2. Applies to Cisco IOS Release 11.x feature sets that require more than 4-MB Flash memory. Not available as a spare. Supported on the Cisco 2517, 2518, 2519, and AccessPro PC cards.
3. Applies to Cisco IOS Release 11.x feature sets that require more than 4-MB Flash memory. Not available as a spare. Supported on the Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers.
4. Dual-bank Flash memory is required for Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers because these models contain only one slot for Flash memory. It can operate as either two banks of 4 MB for dual-Flash bank operation or as 8 MB contiguous. Supported on the Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers.
5. Dual-bank Flash memory is required for Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers because these models contain only one slot for Flash memory. It can operate as either two banks of 8 MB for dual-Flash bank operation or as 16 MB contiguous. Supported on the Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers.

Table 150   Cisco 2500 Series Cables

Cables	Product Number
EIA/TIA-232 male DTE interface, 10' (3 m)	CAB-232MT
EIA/TIA-232 female DCE interface, 10' (3 m)	CAB-232FC
EIA/TIA-449 male DTE interface, 10' (3 m)	CAB-449MT
EIA/TIA-449 female DCE interface, 10' (3 m)	CAB-449FC
EIA-530 male DTE interface, 10' (3 m)	CAB-530MT
V.35 male DTE interface, 10' (3 m)	CAB-V35MT
V.35 female DCE interface, 10' (3 m)	CAB-V35FC
X.21 male DTE interface, 10' (3 m)	CAB-X21MT
X.21 female DCE interface, 10' (3 m)	CAB-X21FC
Ethernet AUI adapter cable	CAB-3CE18=
Auxiliary/console cable kit[1]	ACS-2500ASYN
RJ-45-to-DB-25 management card console cable[2]	CAB-MGMT-RH
Shielded power cable, United States[2]	CABS-AC
Shielded power cable, Australia[2]	CABS-ACA
Shielded power cable, Italy[2]	CABS-ACI
Shielded power cable, Europe[2]	CABS-ACE
Shielded power cable, United Kingdom[2]	CABS-ACU

1. The auxiliary/console cable kit includes a RJ-45-to-RJ-45 roll-over console cable, an RJ-45-to-DB-25 male DCE adapter, an RJ-45-to-DB-25 female DTE adapter, and an RJ-45-to-DB-9 adapter.
2. Applies to the Cisco 2517, Cisco 2518, and Cisco 2519 router/hubs only.

Single LAN Routers

Models 2501, 2502, 2503, 2504, 2520, 2521, 2522, and 2523 contain the common Cisco 2500 series features listed in Table 135. In addition, these models support the network interfaces listed in Table 151.

Note This section discusses standard models. The mission-specific models are described in the section "Mission-Specific Routers," later in this chapter.
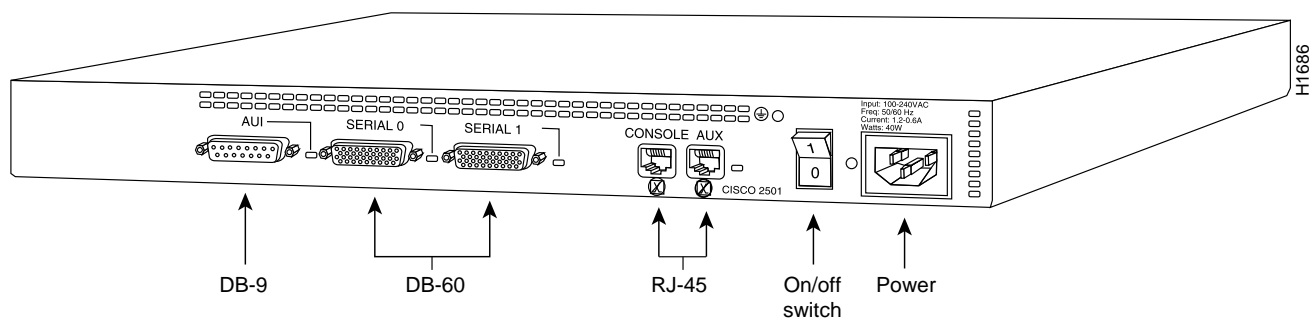

Table 151   Single LAN Router Network Interfaces

Model	Ethernet	Token Ring	Low-Speed Serial[1]	Serial[2]	ISDN BRI
2501	1	0	0	2	0
2502	0	1	0	2	0
2503	1	0	0	2	1
2504	0	1	0	2	1
2520	1	0	2	2	1
2521	0	1	2	2	1
2522	1	0	8	2	1
2523	0	1	8	2	1

1. Synchronous and asynchronous.

2. Synchronous.

Figure 54   Cisco 2501 Rear Panel

DB-9   DB-60   RJ-45   On/off   Power
                                        switch

Figure 55   Cisco 2502 Rear Panel

TOKEN RING   SERIAL 0   SERIAL 1   CONSOLE AUX

Input: 100-240VAC
Freq: 50/60 Hz
Current: 1.2-0.6A
Watts: 40W

CISCO 2502

1
0

DB-9   DB-60   RJ-45   On/off switch   Power

H1687
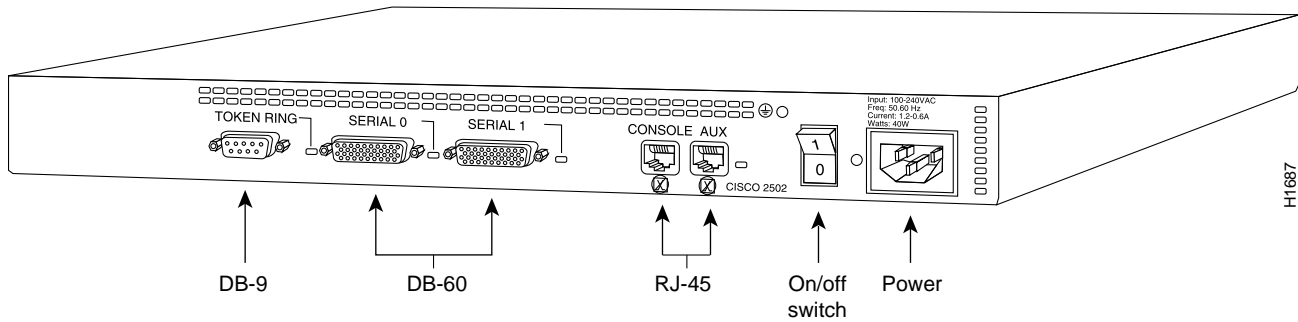
Figure 56   Cisco 2503 Rear Panel

AUI   SERIAL 0   SERIAL 1   BRI CONSOLE AUX

Input: 100-240VAC
Freq: 50/60 Hz
Current: 1.2-0.6A
Watts: 40W

CISCO 2503

1
0

DB-15   DB-60   RJ-45   On/off switch   Power

H1688
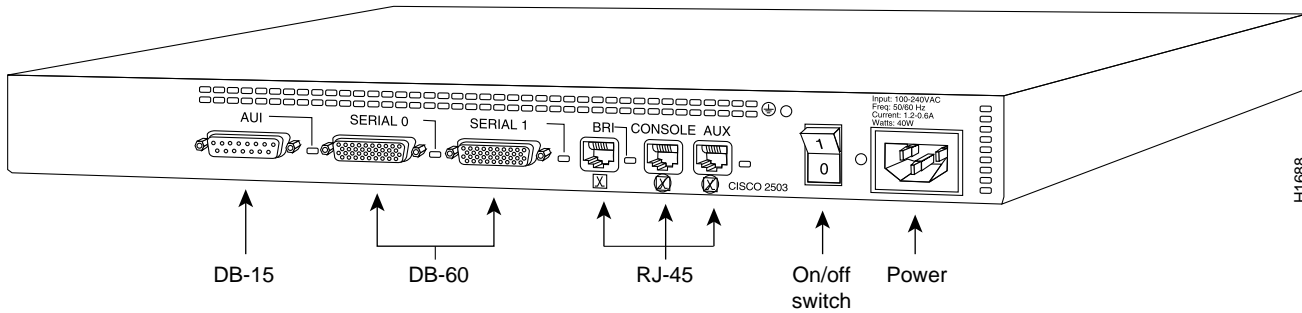
Figure 57   Cisco 2504 Rear Panel

TOKEN RING   SERIAL 0   SERIAL 1   BRI CONSOLE AUX

Input: 100-240VAC
Freq: 50/60 Hz
Current: 1.2-0.6A
Watts: 40W

CISCO 2504

1
0

DB-9   DB-60   RJ-45   On/off switch   Power

H1689
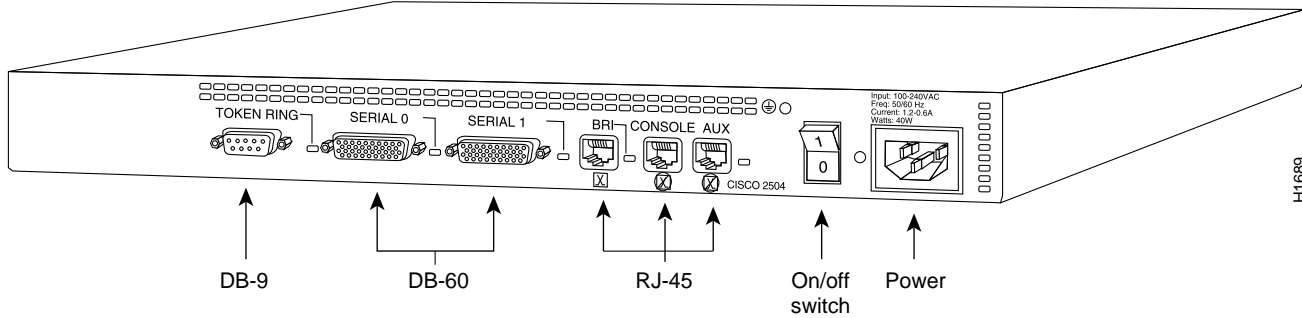
Figure 58   Cisco 2520 Rear Panel

SERIAL 0   SERIAL 1   SERIAL 2 (A/S)   SERIAL 3 (A/S)   ETHERNET 0   AUI   LINK ACT   10BT BRI 0   PWR   CONSOLE AUX

Input: 100-240VAC
Freq: 50/60 Hz
Current: 1.2-0.6 A
Watts: 40W

Cisco 2520

1
0

DB-60   DB-60   DB-15   RJ-45   On/off switch   Power

H6707

274
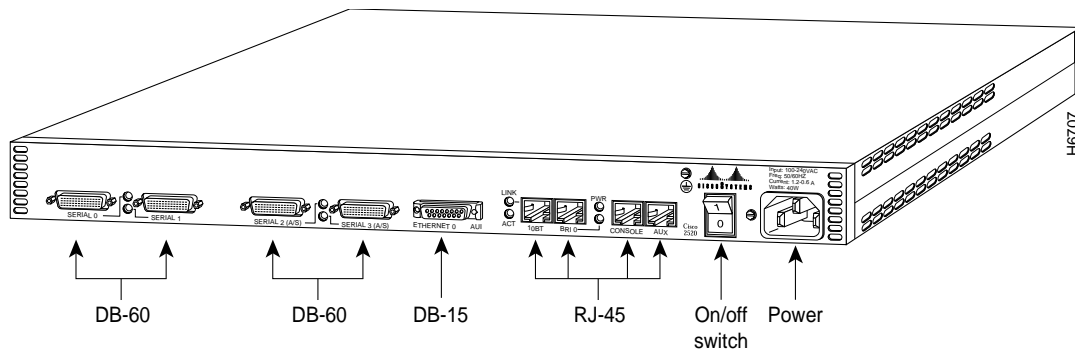
Figure 59   Cisco 2521 Rear Panel

DB-60   DB-9   UTP   ISDN   RJ-45   On/off   Power
Ethernet   (BRI)   switch
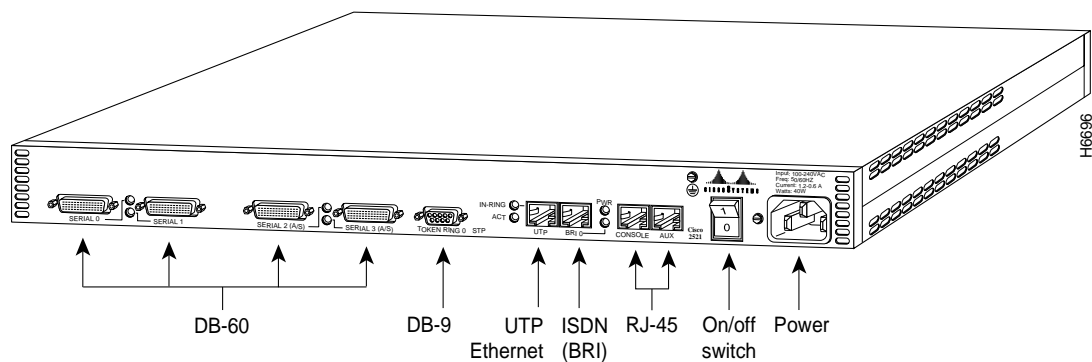
Figure 60   Cisco 2522 Rear Panel

DB-60   DB-15   10BaseT   RJ-45   On/off   Power
ISDN   switch
(BRI)

Figure 61   Cisco 2523 Rear Panel

DB-60

DB-60   DB-15   UTP   ISDN   RJ-45   On/off   Power
Ethernet   (BRI)   switch

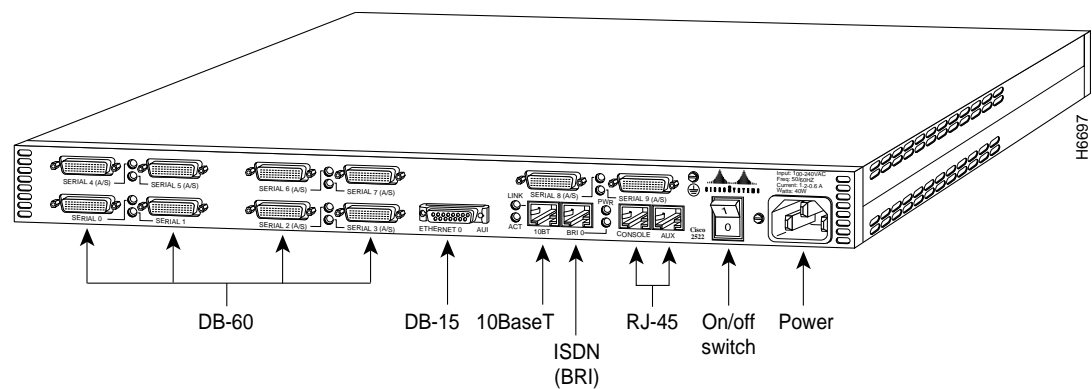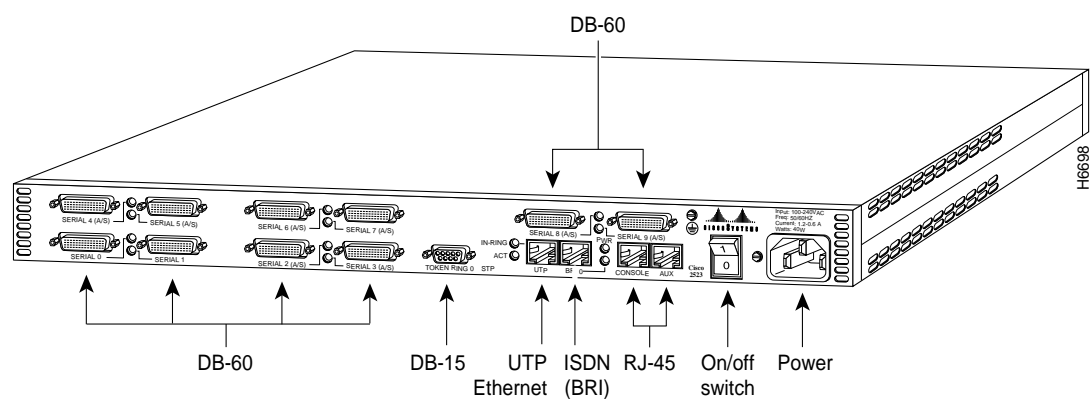**275**

Mission-Specific Routers

Mission-specific routers are entry-level routers that are based on standard Cisco 2500 hardware. However, mission-specific routers contain less memory than standard models and run reduced software images designed for CFRAD, LAN FRAD, and ISDN applications. These reduced software images disable unused ports. Mission-specific routers can be upgraded to full standard model functionally by purchasing additional software and memory.

The network interfaces for the Cisco 2500 series mission-specific routers are listed in Table 152.

Table 152   Mission-Specific Router Network Interfaces

Model	Ethernet	Token Ring	Serial	Low-Speed Serial	ISDN BRI
2501CF	Software disabled	0	2	0	0
2501LF	1	0	2	0	0
2502CF	0	Software disabled	2	0	0
2502LF	0	1	2	0	0
2503I	1	0	Software disabled	0	1
2504I	0	1	Software disabled	0	1
2520CF	Software disabled	0	2	2	Software disabled
2520LF	1	0	2	2	Software disabled
2521CF	0	Software disabled	2	2	Software disabled
2521LF	0	1	2	2	Software disabled
2522CF	Software disabled	0	2	8	Software disabled
2522LF	1	0	2	8	Software disabled
2523CF	0	Software disabled	2	8	Software disabled
2523LF	0	1	2	8	Software disabled

The CFRAD-, LAN FRAD, and ISDN-specific protocols are listed in Table 153, Table 154, and Table 155, respectively.

Table 153   CFRAD Platform-Specific Protocols

Category	Cisco IOS Release 11.1[1]	Cisco IOS Release 11.0[1]	Cisco IOS Release 10.3[2]	Cisco IOS Release 10.2[2]
LAN support	–	–	–	–
WAN services	Frame Relay, PPP[3]	Frame Relay, PPP	Frame Relay, PPP	Frame Relay, PPP
WAN optimization	Header, link, and payload compression[4]; custom and priority queuing; weighted fair queuing	Header, link, and payload compression[4]; custom and priority queuing; weighted fair queuing	Header, link, and payload compression; custom and priority queuing	Header, link, and payload compression; custom and priority queuing
IP routing	RIP, RIP Version 2, IGRP, Enhanced IGRP	RIP, IGRP, Enhanced IGRP	RIP, IGRP, Enhanced IGRP	RIP, IGRP, Enhanced IGRP

Category	Cisco IOS Release 11.1[1]	Cisco IOS Release 11.0[1]	Cisco IOS Release 10.3[2]	Cisco IOS Release 10.2[2]
Other routing	–	–	–	–
IBM support	RSRB, RFC 1795 DLSw, SNA WAN optimization via local acknowledgment, caching and filtering, SDLC Integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), Netview Native Service Point, Bisync, polled async (ADT, ADPLEX), BAN for SNA Frame Relay support	RSRB, RFC 1795 DLSw, SNA WAN optimization via local acknowledgment, caching and filtering, SDLC Integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), Netview Native Service Point, Bisync, polled async (ADT, ADPLEX),	RSRB, RFC 1795 DLSw, SNA WAN optimization via local acknowledgment, caching and filtering, SDLC Integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490)	RSRB, SNA WAN optimization via local acknowledgment, caching and filtering, SDLC Integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN)
Management	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet
Security	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication, Lock and Key	Access lists, extended access lists, access security, TACACS+	Access lists, extended access lists, access security, TACACS+	Access lists, extended access lists, access security, TACACS

1. Cisco IOS Release 11.x CFRAD software is a available with the following models: 2501CF, 2502CF, 2520CF, 2521CF, 2522CF, and 2523CF.
2. Cisco IOS Release 10.3 and 10.2 CFRAD software is available with the Cisco 2501CF and 2502CF models only.
3. PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, PPP compression, and Multilink PPP.
4. Frame Relay payload compression is available in Cisco IOS Release 11.0(4) and later releases.

Table 154   LAN FRAD Platform-Specific Protocols

Category	Cisco IOS Release 11.1[1]	Cisco IOS Release 11.0[2]
LAN support	IP, multiring, GRE, Novell IPX, transparent bridging	IP, multiring, GRE, Novell IPX, transparent bridging
WAN services	Frame Relay, PPP[3]	Frame Relay, PPP[3]
WAN optimization	Header, link, and payload compression[4]; custom and priority queuing; weighted fair queuing	Header, link, and payload compression[4]; custom and priority queuing; weighted fair queuing
IP routing	RIP, RIP Version 2, IGRP, Enhanced IGRP, OSPF	RIP, IGRP, Enhanced IGRP, OSPF
Other routing	IPX RIP	IPX RIP
IBM support	SRB/RSRB, SRT, RFC 1795 DLSw, SNA WAN optimization via local acknowledgment, caching and filtering, SDLC Integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), Netview Native Service Point, Bisync, polled async (ADT, ADPLEX), BAN for SNA Frame Relay support	SRB/RSRB, SRT, RFC 1795 DLSw, SNA WAN optimization via local acknowledgment, caching and filtering, SDLC Integration, SDLC-to-LAN conversion (SDLLC), SDLC transport (STUN), Frame Relay SNA Support (RFC 1490), Netview Native Service Point, Bisync, polled async (ADT, ADPLEX)
Management	AutoInstall, SNMP, Telnet	AutoInstall, SNMP, Telnet
Security	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication, Lock and Key	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication

1. LAN FRAD software is available with Cisco IOS Release 11.1(2) and 11.1(3).
2. Cisco IOS Release 11.0(5) LAN FRAD software is available with the following models: 2501LF, 2502LF, 2520LF, 2021LF, 2522LF, and 2523LF.
3. PPP includes support for LAN protocols supported by the feature set, PAP and CHAP authentication, PPP compression, and Multlink PPP.
4. Frame Relay payload compression is supported in Cisco IOS Release 11.0 and later releases.

Table 155   Model 2503I and Model 2504I ISDN Platform-Specific Protocols

Category	Cisco IOS Release 11.1	Cisco IOS Release 11.0	Cisco IOS Release 10.3	Cisco IOS Release 10.2
LAN support	IP, transparent and translational bridging, multiring, GRE, Novell IPX, AppleTalk 1 and 2	IP, transparent and translational bridging, multiring, GRE, Novell IPX, AppleTalk 1 and 2	IP, transparent and translational bridging, multiring, GRE, Novell IPX, AppleTalk 1 and 2	IP, transparent and translational bridging, multiring, GRE, Novell IPX, AppleTalk 1 and 2
WAN services	ISDN[1] and PPP[2]	ISDN[1] and PPP[2]	ISDN[1] and PPP[2]	ISDN[1] and PPP[2]
WAN optimization	Header[3] and link compression, dial-on-demand, dial backup, bandwidth-on-demand[4], custom and priority queuing, weighted fair queuing, snapshot routing	Header and link compression, dial-on-demand, dial backup, bandwidth-on-demand[4], custom and priority queuing, weighted fair queuing, snapshot routing	Header and link compression, dial-on-demand, dial backup, bandwidth-on-demand[4], custom and priority queuing, snapshot routing	Header and link compression, dial-on-demand, dial backup, bandwidth-on-demand[4], custom and priority queuing, snapshot routing
IP routing	RIP, RIP Version 2, IGRP, and Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, IGRP, and Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing	RIP, IGRP, and Enhanced IGRP, OSPF, BGP, EGP, NHRP	RIP, IGRP, and Enhanced IGRP, OSPF, BGP, EGP, PIM
Other routing	IPX RIP, RTMP, AURP	IPX RIP, RTMP, AURP	IPX RIP, RTMP, AURP	IPX RIP, RTMP, AURP
IBM support	–	–	–	–
Management	SNMP, Telnet, RMON events and alarms[5]	SNMP, Telnet	SNMP, Telnet	SNMP, Telnet
Security	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication, Lock and Key	Access lists, extended access lists, access security, TACACS+, MD5 routing authentication	Access lists, extended access lists, access security, TACACS+	Access lists, extended access lists, access security, TACACS

1. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.
2. PPP includes support for LAN protocols supported by the feature set, PAP and CHAP authentication, and PPP compression. Multlink PPP is available with Cisco IOS Release 11.0(4) and later releases.
3. IPX header compression is available with Cisco IOS Release 11.1(1) and later releases.
4. Bandwidth-on-demand means two B channel calls to the same destination.
5. RMON events and alarms is available with Cisco IOS Release 11.1(2) and later releases.

Mission-specific routers can be upgraded to run Cisco IOS feature sets by using the product numbers listed in Table 156. Note that you must order two product numbers: an upgrade path plus the release-specific software. For example, to upgrade a Cisco 2501CF to the IP routing feature set, order FR25-FC= to upgrade from mission-specific software to the IP feature set and also order SW25C-xx.x.x= to obtain the Cisco IOS IP routing software.

Table 156   Mission-Specific Router Software Upgrades

Upgrade to Feature Set	CFRAD Product Number[1, 2]	ISDN Product Number[1, 3]
IP routing	FR25-FC= and SW25C-xx.x.x=	FR25-IC= and SW25C-xx.x.x=
IP with IBM base functionality	FR25-FCS= and SW25CS-xx.x.x=	FR25-ICS= and SW25CS-xx.x.x=
IP/IPX	FR25-FD= and SW25D-xx.x.x=	FR25-ID= and SW25D-xx.x.x=
IP/IPX with IBM base functionality	FR25-FDS= and SW25DS-xx.x.x=	FR25-IDS= and SW25DS-xx.x.x=
IP/IPX/IBM/APPN	FR25-FDS=, FR25-APPN=, and SW25DSN-xx.x.x=	FR25-IDS=, FR25-APPN=, and SW25DSN-x.x.x=
Desktop	FR25-FB= and SW25B-xx.x.x=	FR25-IB= and SW25B-xx.x.x=
Desktop with IBM base functionality	FR25-FBS= and SW25BS-xx.x.x=	FR25-IBS= and SW25BS-xx.x.x=
Enterprise	FR25-FA= and SW25A-xx.x.x=	FR25-IA= and SW25A-xx.x.x=
IP/RMON	FR25-FC=, FR25-RMON=, and SW25CR-x.x.x=	FR25-IC=, FR25-RMON=, and SW25CR-x.x.x=
IP/IBM/RMON	FR25-FCS=, FR25-RMON=, and SW25CSR-x.x.x=	FR25-ICS=, FR25-RMON=, and SW25CSR-x.x.x=
IP/IPX/RMON	FR25-FD=, FR25-RMON, and SW25DR-x.x.x=	FR25-ID=, FR25-RMON=, and SW25DR-x.x.x=
IP/IPX/IBM/RMON	FR-FDS=, FR25-RMON=, and SW25DSR-x.x.x=	FR25-IDS=, FR25-RMON=, and SW25DSR-x.x.x=
Enterprise/RMON	FR25-FA=, FR25-RMON=, and SW25DSR-x.x.x=	FR25-IA=, FR25-RMON=, and SW25AR-x.x.x=

1. For Cisco IOS Release 11.1, 11.0, 10.3, and 10.2 upgrades, substitute the release number for xx.x.x in the product number (for example, SW25C-11.1.1=).
2. Applies to the Cisco 2501CF and 2502CF only.
3. Applies to the Cisco 2503I and 2504I only.

Router/Hub Combinations

Models 2505, 2507, and 2516 to 2519 support integrated hub functionality as well as all the common features listed in Table 135. In addition, these models support the interfaces listed in Table 157.

Table 157   Router/Hub Interface Options

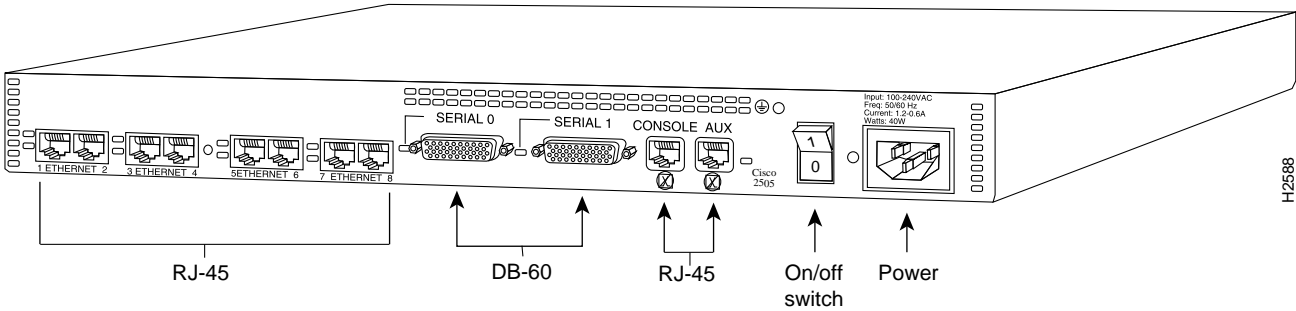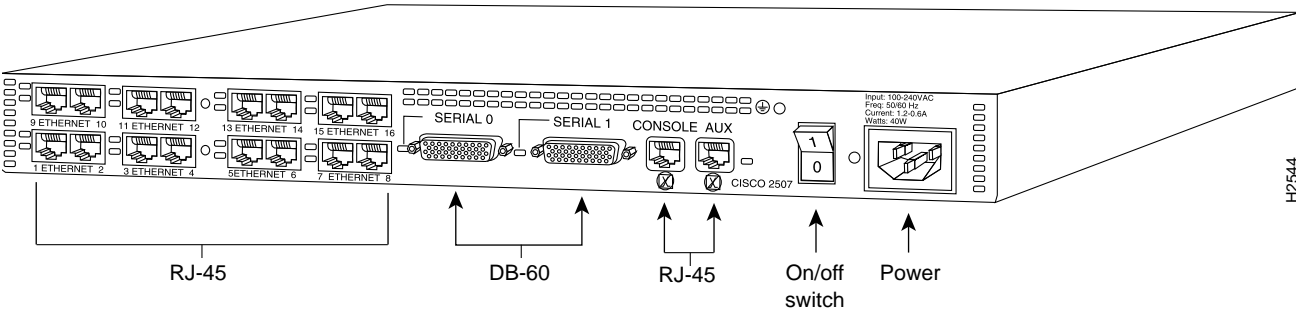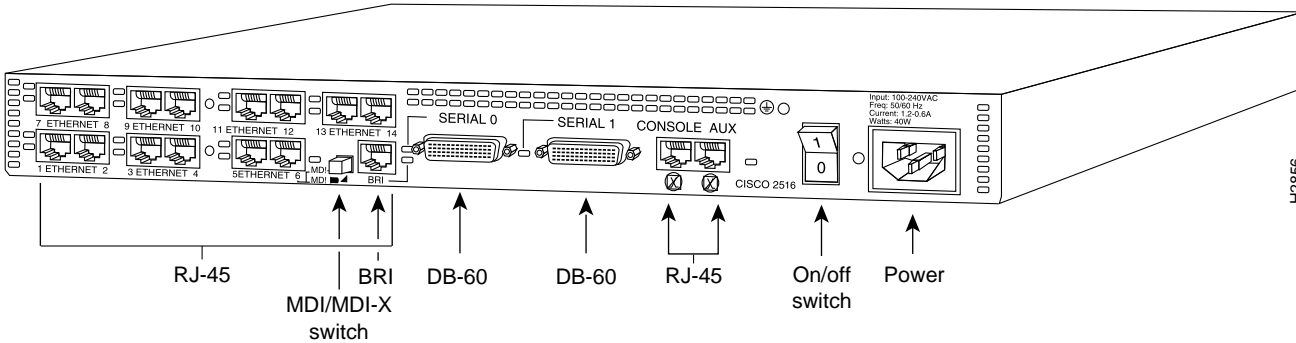| Model	Ethernet 10BaseT	Ethernet AUI	Token Ring	Token Ring Ring In/ Ring Out	Serial	Hub Ports	BRI
2505	1	0	0	0	2	8	0
2507	1	0	0	0	2	16	0
2516	1	0	0	0	2	14	1
2517	0	0	1	0	2	11	1
2518	1	1	0	0	2	23	1
2519	0	0	1	1	2	23	1

Figure 62   Cisco 2505 Rear Panel

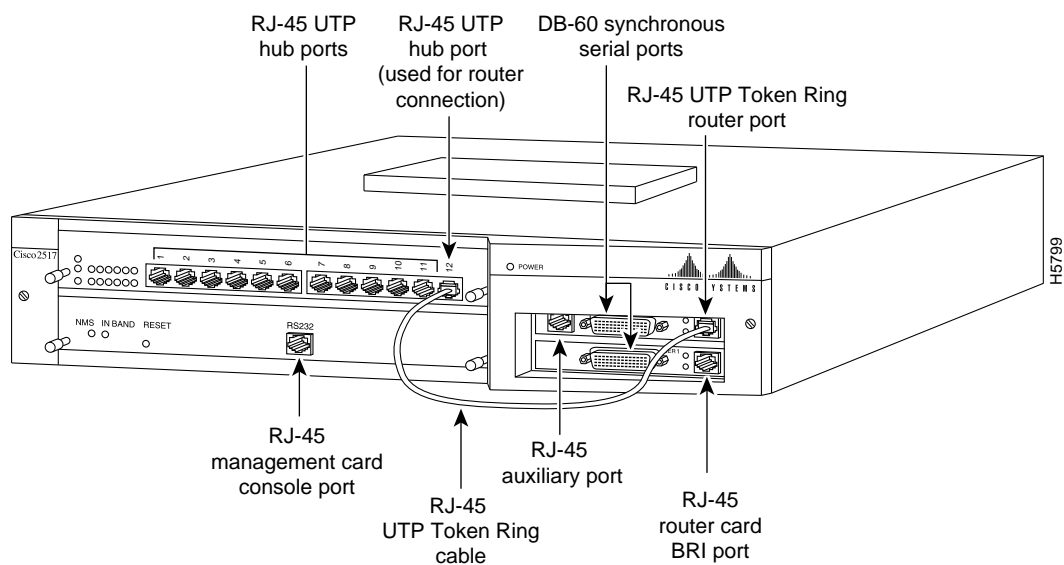**Figure 63   Cisco 2507 Rear Panel**

Figure 64   Cisco 2516 Rear Panel

Figure 65   Cisco 2517 Rear Panel

RJ-45 UTP
hub ports

RJ-45 UTP
hub port
(used for router
connection)

DB-60 synchronous
serial ports

RJ-45 UTP Token Ring
router port

Cisco 2517

NMS IN BAND RESET

RS232

POWER

CISCO SYSTEMS

H5799

RJ-45
management card
console port

RJ-45
auxiliary port

RJ-45
UTP Token Ring
cable

RJ-45
router card
BRI port

Figure 66   Cisco 2518 Rear Panel

Ethernet
AUI

RJ-45 UTP
hub ports

RJ-45 UTP
hub port
(used for router
connection)

DB-60 synchronous
serial ports

RJ-45 UTP Ethernet
router port

NMS IN BAND RESET

RS232

POWER

CISCO SYSTEMS

H5800

RJ-45
management card
console port

RJ-45
auxiliary port

RJ-45
UTP Ethernet
cable

RJ-45
router card
BRI port

281
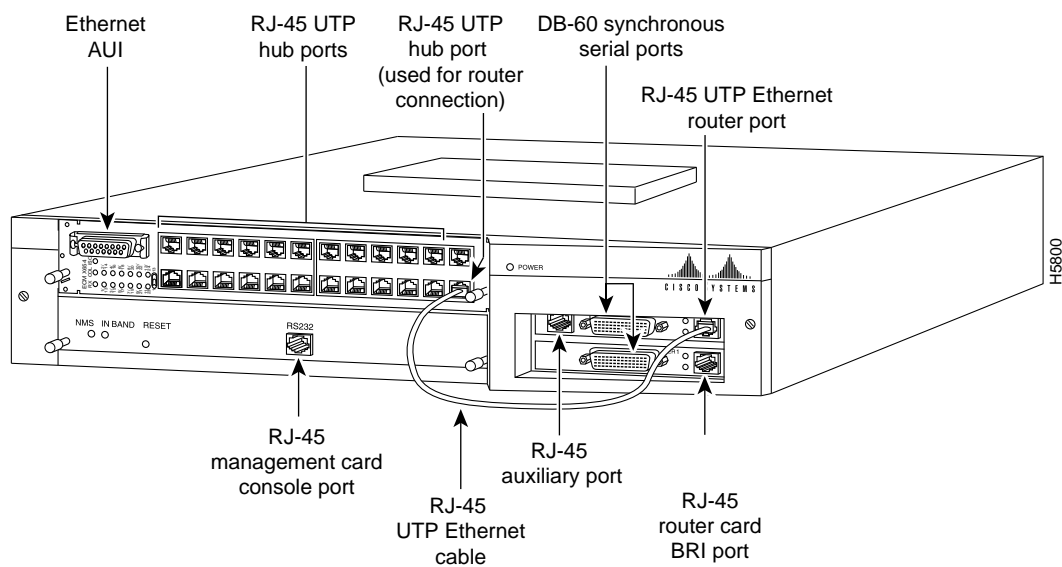
Figure 67   Cisco 2519 Rear Panel
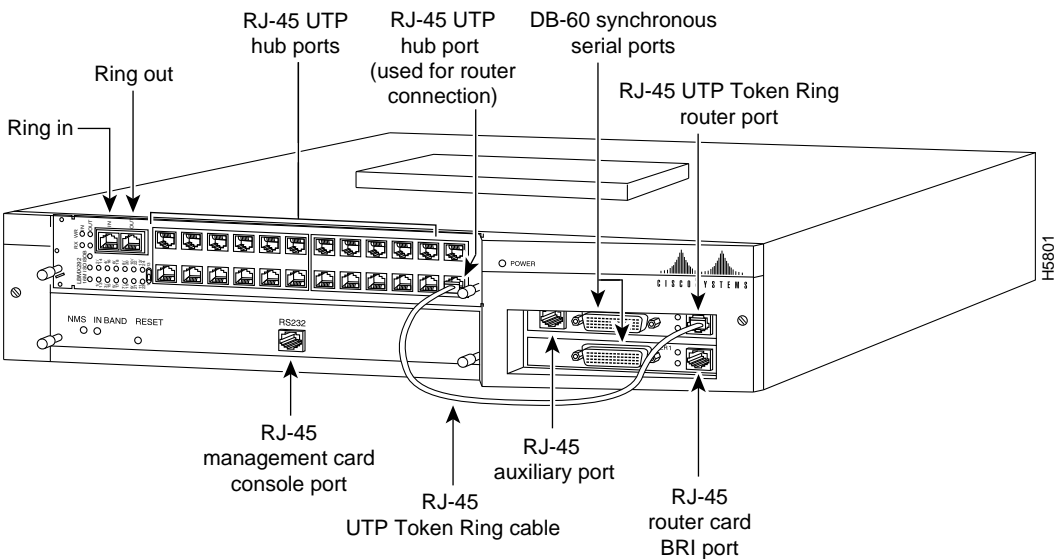
Access Servers

Models 2509, 2510, 2511, and 2512 are designed to function as access servers for remote node and asynchronous/synchronous routing. For complete information, refer to the chapter "Access Servers" later in the catalog.

Dual LAN Routers

Models 2513, 2514, and 2515 provide higher density LAN support and include all the common features listed in Table 135. In addition, these models support the interfaces listed in Table 158.

Table 158   Dual LAN Router Interface Options

Model	Ethernet	Token Ring	Serial	ISDN BRI
2513	1	1	2	0
2514	2	0	2	0
2515	0	2	2	0

Figure 68   Cisco 2513 Rear Panel

TOKEN RING   AUI   SERIAL 0   SERIAL 1   CONSOLE AUX

Input: 100-240VAC
Freq: 50/60 Hz
Current: 1.2-0.6A
Watts: 40W

CISCO 2513

1
0

H2547

DB-9   DB-15   DB-60   RJ-45   On/off   Power
switch
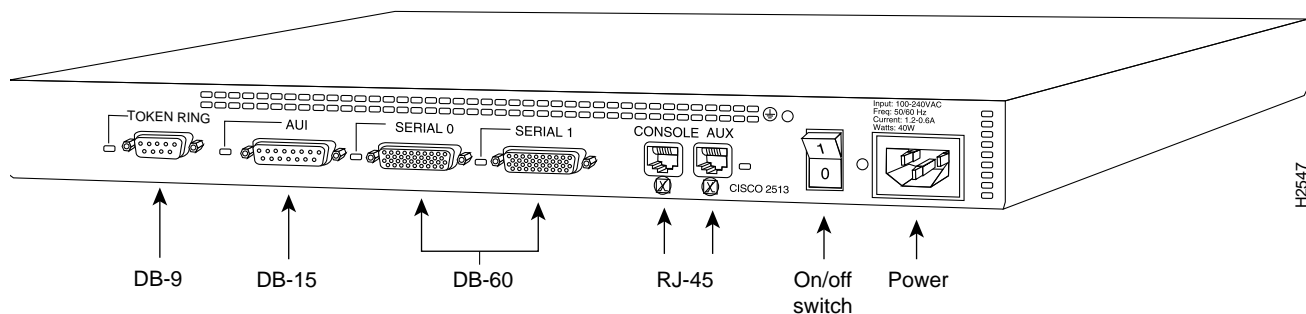
Figure 69   Cisco 2514 Rear Panel

AUI   AUI   SERIAL 0   SERIAL 1   CONSOLE AUX

Input: 100-240VAC
Freq: 50/60 Hz
Current: 1.2-0.6A
Watts: 40W

CISCO 2514

1
0

H2546

DB-15   DB-15   DB-60   RJ-45   On/off   Power
switch

Figure 70   Cisco 2515 Rear Panel

TOKEN RING   TOKEN RING   SERIAL 0   SERIAL 1   CONSOLE AUX

Input: 100-240VAC
Freq: 50/60 Hz
Current: 1.2-0.6A
Watts: 40W

CISCO 2515

1
0

H2548

DB-9   DB-9   DB-60   RJ-45   On/off   Power
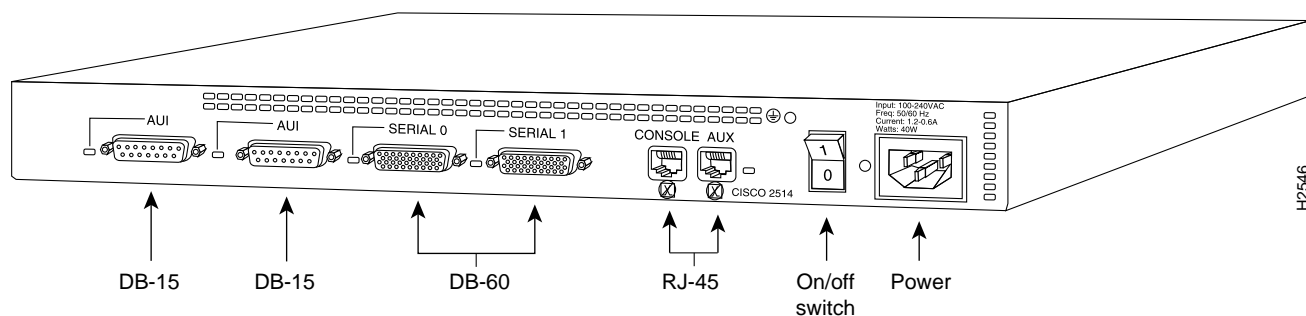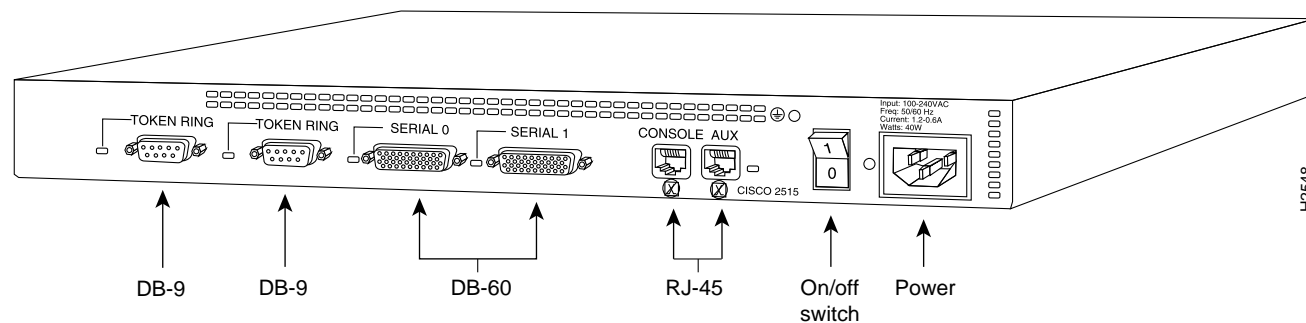switch

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Modular Routers

Models 2524 and 2525 provide LAN and WAN access in a low-cost modular router platform that can grow with your internetworking needs. The Cisco 2524 offers an Ethernet (AUI or 10BaseT) LAN connection, and the Cisco 2525 offers a Token Ring (STP or UTP) LAN connection. Both routers can accommodate up to three WAN modules—two synchronous serial and one ISDN.

The choice of synchronous serial WAN modules is as follows:

- 2-wire switched 56-kbps DSU/CSU

- 4-wire 56/64-kbps DSU/CSU

- Fractional T1/T1 DSU/CSU

- Five-in-one synchronous serial

Note The five-in-one synchronous serial WAN module gets its name from the five types of signaling it supports, which include the following: EIA/TIA-232, EIA/TIA-449, V.35, X.21, and EIA-530. You can order from Cisco Systems a DB-60 shielded serial transition cable. The router end of the shielded serial transition cable has a DB-60 connector; the other end of the cable has the appropriate connector for the standard interface you specify.

The choice of ISDN WAN modules is as follows:

- ISDN BRI
- ISDN with integrated NT1 device

The ISDN WAN modules are keyed so that you cannot insert them into the synchronous serial WAN slots. A blank slot cover is installed over unused slots.

Figure 71 shows the rear panel of the Cisco 2524 router, and Figure 72 shows the rear panel of the Cisco 2525 router.

Figure 73 through Figure 78 show the WAN modules. Figure 79 shows the blank slot cover.
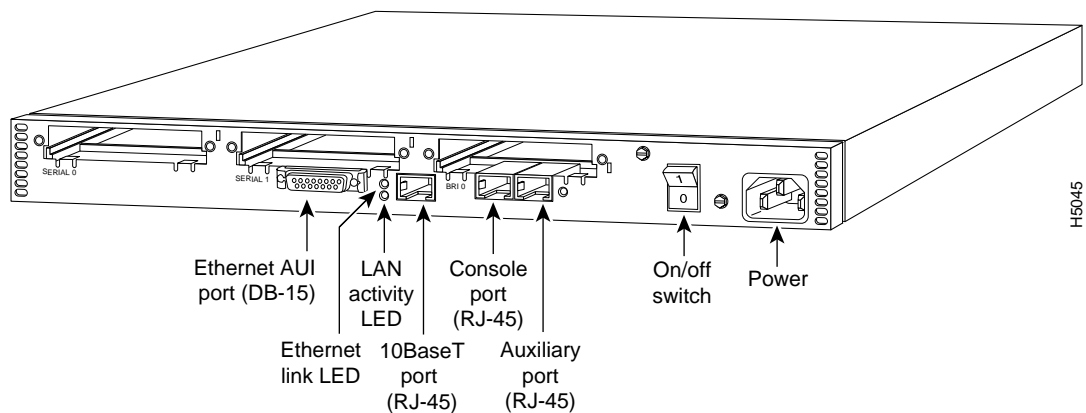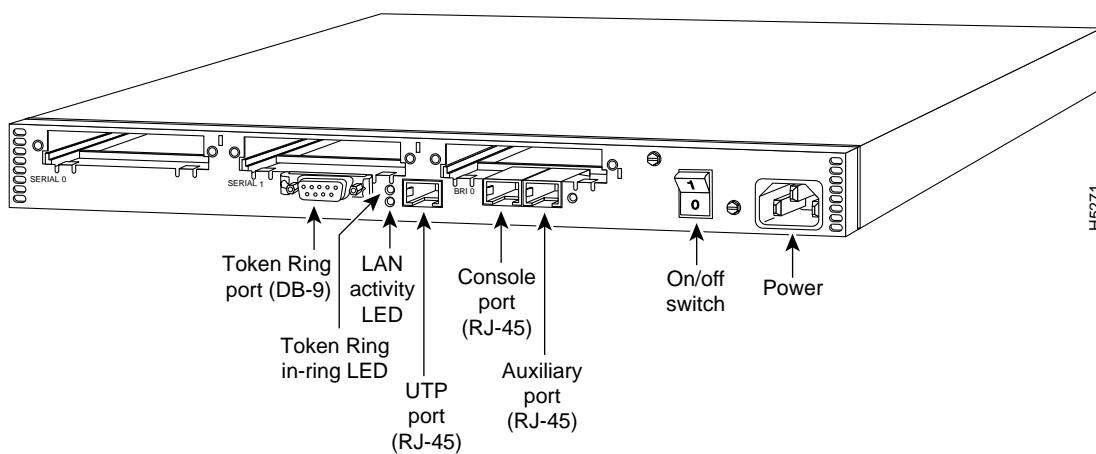
Figure 71   Cisco 2524 Rear Panel

SERIAL 0   SERIAL 1   BRI 0   1 0

Ethernet AUI
port (DB-15)

LAN
activity
LED

Console
port
(RJ-45)

On/off
switch

Power

H5045

Ethernet
link LED

10BaseT
port
(RJ-45)

Auxiliary
port
(RJ-45)

Figure 72   Cisco 2525 Rear Panel

SERIAL 0   SERIAL 1   BRI 0   1 0

Token Ring
port (DB-9)

LAN
activity
LED

Console
port
(RJ-45)

On/off
switch

Power

H5271

Token Ring
in-ring LED

UTP
port
(RJ-45)

Auxiliary
port
(RJ-45)

Figure 73   2-Wire Switched 56-kbps DSU/CSU WAN Module

Transmit
LED

Loopback
LED

2-WIRE
56K
DSU/CSU

TX   LB

CD   RX   AL

H5046

Captive
screw

RJ-11

Carrier
detect
LED

Alarm
LED

Captive
screw

Receive
LED

285

Figure 74   4-Wire 56/64-kbps DSU/CSU WAN Module

Transmit
LED

Loopback
LED

TX   LB

4-WIRE
56K/64K
DSU/CSU

CD   RX   AL

H5047

Captive
screw
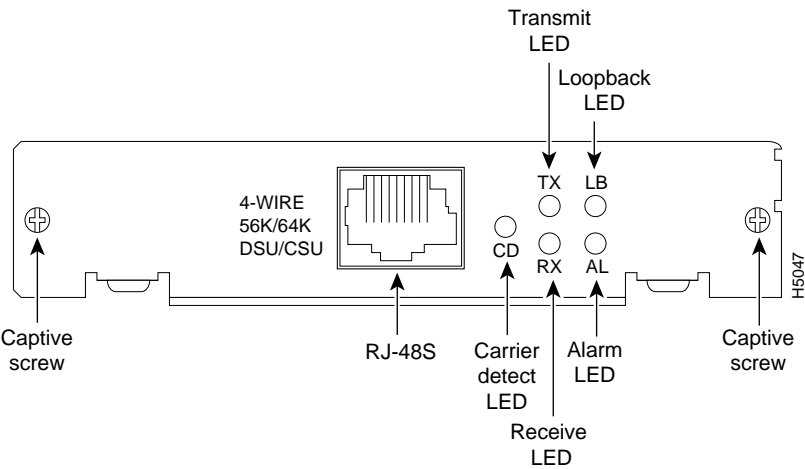
RJ-48S

Carrier
detect
LED

Alarm
LED

Captive
screw

Receive
LED
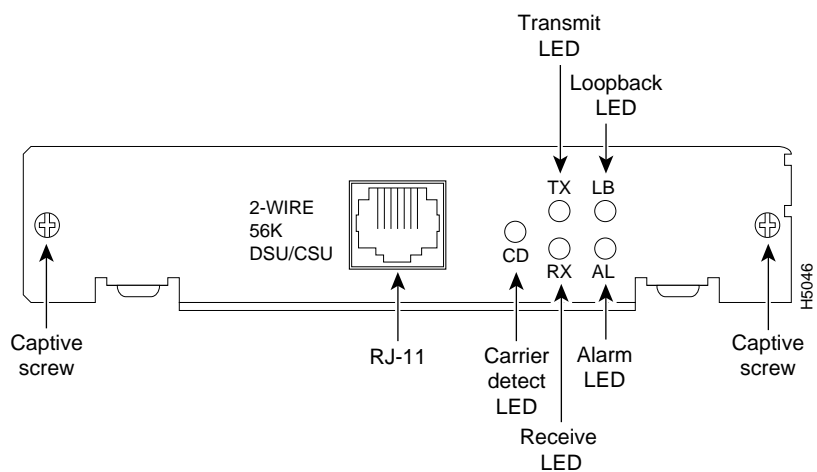
Figure 75   Fractional T1/T1 DSU/CSU WAN Module

Transmit
LED

Loopback
LED

MON   JACK

TX   LB

FTI/TI
DSU/CSU

CD   RX   AL

IN   OUT

NET

H5048

Captive
screw

Monitor
jack

RJ-48C

Carrier
detect
LED

Alarm
LED

Captive
screw

Receive
LED
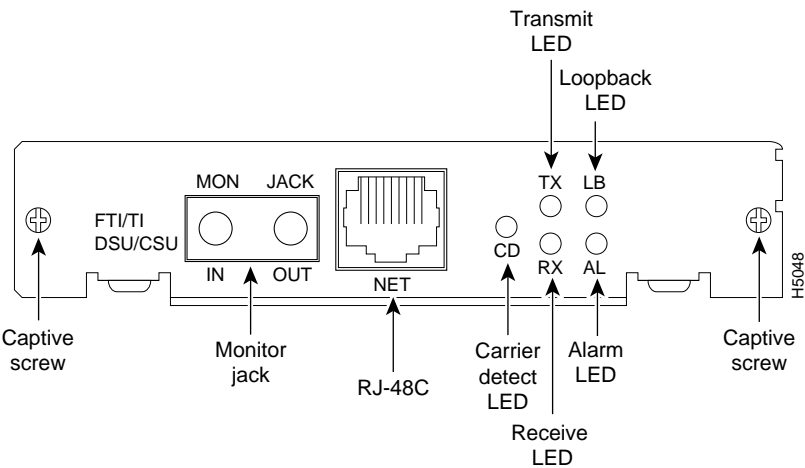
Figure 76   ISDN BRI WAN Module

ISDN-BRI

ACTIVITY

S/T

H5050

Captive
screw

RJ-45

ISDN BRI
activity LED

Captive
screw

286
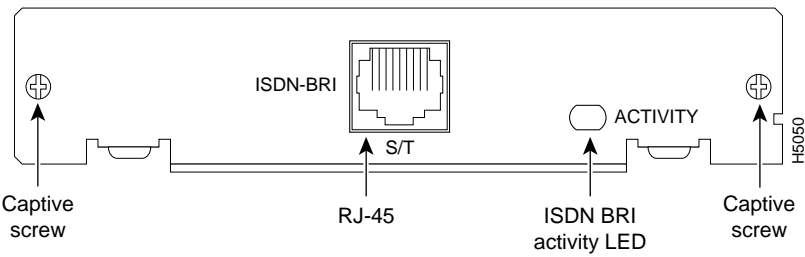
Figure 77   ISDN BRI with Integrated NT1 WAN Module

ISDN-BRI
with NTI

ACT   NTI

U

Captive
screw

RJ-45

Captive
screw

H5051
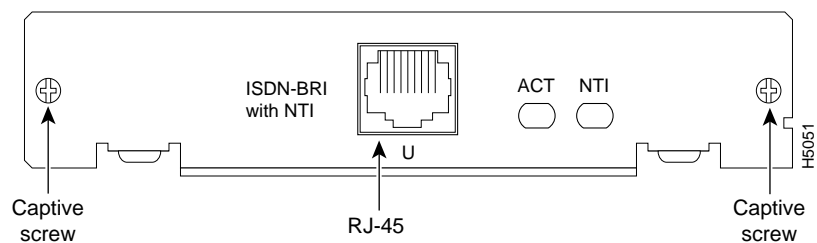
Figure 78   Five-in-One Synchronous Serial WAN Module

SERIAL

ACTIVITY

Captive
screw

DB-60

Serial
activity LED

Captive
screw

H5049
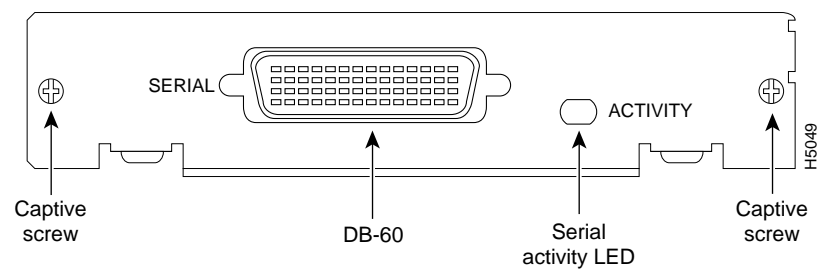
Figure 79   Blank Slot Cover

BLANK

Do not plug/unplug modules with power on.

Captive
screw

Captive
screw

H5052

287